THE PSYCHOLOGY OF VOCATIONAL ADJUSTMENT

BY HARRY DEXTER KITSON

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THE PSYCHOLOGY OF VOCATIONAL ADJUSTMENT

BY

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TO

WILLIAM LOWE BRYAN

PREFACE

THIS book is designed: (1) to point out the psychological problems involved in choosing a vocation and becoming proficient therein; (2) to describe the attempts that have been made toward their solution; and (3) to suggest and illustrate scientific methods that may be employed in the exploration of the vast field that remains to be covered.

The groups of people who are interested in these problems are exceedingly diverse. Business executives, particularly personnel directors and production managers, realize that on the adjustment of the worker to his work depends largely the effectiveness of business management. Social workers and professional sociologists realize that in this same adjustment lies the amelioration of many social ills, such as poverty, unemployment, and industrial restlessness. Economists are unanimous in subscribing to the need for recognition of the psychological phase of vocational adjustment. Educators are laying great stress upon it in the movements known as educational and vocational guidance. Moralists regard it as one of the chief means of raising ethical standards. Psychologists see in it a worthy field for the application of their technique. Finally, individual workers, harassed by doubts of their own powers and baffled by the multiplicity of opportunities, regard a happy vocational adjustment as a means of their social, moral, and economic salvation.

Many of these groups do not know of the existence of the others. For example, those working in academic circles do not know of the intense interest that practical workers such as vocational counsellors and personnel directors have in these problems. It is hoped that this book will reveal these disparate groups to each other; that it will serve as a text-book for students in Schools of Commerce, Engineering, and Education, who are studying the problems theoretically; and that it will be a handbook for business executives who desire a clear formulation of

the psychological problems confronting them and who wish to know what services the science of psychology can render.

For the benefit of those readers who believe that psychological tests constitute the sole technique of vocational adjustment and who deplore the absence from this book of detailed presentation of tests the author begs indulgence on the following grounds. In the first place, the literature of psychological tests is so voluminous that to treat it adequately would require a volume several times the size of this one. In the second place, there are already available a number of books devoted solely to tests, which give an understanding of the matter and which make another book on tests superfluous. Third, and most important, is the reason that, despite their popularity, psychological tests have made but little contribution to the actual work of vocational adjustment. Every serious psychologist must admit that before practical application of them can be made there must come great advances in the technique of tests and in the investigation of large numbers of workers in numerous vocations. The technique is still insufficient to bring about the results so greatly desired.

This book attempts to establish a feasible proportion between tests and other psychological instruments of vocational adjustment. It attempts to offset the decent inhibitions dictated by the conservative claims of science with positive declarations regarding possible developments. It tries to go further and show the phases of vocational adjustment in which psychology can make substantial and enduring contributions, which will not be subject to the artifacts and distortions that afflict psychological tests. For example, in connection with the investigation of the more obscure causes that lead workers to quit their jobs or change their vocational fields; in connection with the nature of the stimuli that may lead workers to take greater interest in their work and to produce greater output; in connection with the vast field connoted by the terms motive and incentive, the author tries to show that psychology can make important discoveries once it displaces speculative methods by the objective methods of scientific inquiry. Enough proofs are given in this book, it is hoped, to establish this fact in the minds of unprejudiced readers who may have a too narrow view of what the science of

psychology can accomplish in a practical way. Above all, the position is emphatically maintained that vocational psychologizing cannot be carried on exclusively or primarily in the confines of academic laboratories. It must be conducted chiefly among workers engaged in their work. The book can truthfully be said to have been written in the midst of industry.

Every effort has been made to give due acknowledgment of the constructive efforts of past investigators. Copious references have been made to the literature of the subject, so that the reader who wishes to make more intensive incursions into the fields that are given minor emphasis may do so. Especially is it hoped that the deficiencies pointed out will stimulate other investigators to make the researches so sorely needed.

Among the illustrations given of principles and methods are extracts from many of the author's original investigations that have already been published. For permission to reprint portions of these reports grateful acknowledgment is made to the editors of the *Journal of Applied Psychology, Journal of Industrial Hygiene, Journal of Personnel Research, Journal of Political Economy, School and Society, School Review, University Journal of Business, Vocational Guidance Magazine.*

For assistance in prosecuting the investigations here reported much credit should be given to the advanced students at Indiana University, who have arduously compiled data. Valuable assistance has also been given by personnel managers and other business executives who have willingly furnished raw data for study. Though these business executives for the most part desire to remain anonymous it will surely not be improper to render thanks publicly to the group of personnel executives in Indianapolis who for several years have gladly given themselves and their organizations to the quest for factual material relating to the psychology of vocational adjustment. Among those to whom thanks should be individually expressed should be named the author's friend and colleague, Professor W. F. Book, who for several years has been an interested and sympathetic counsellor.

Probably the one to whom every writer on vocational psychology owes the most is he who with pioneering intrepidity, thirty years ago, blazed the way for an experimental approach to

the study of vocations, President William Lowe Bryan. With that same insight which led him, in the days when there was no pattern to follow, to conceive the possibilities of applying the psychological technique to occupations and to envisage the results that might ensue, he has been to the writer of this book a source of ready counsel and stimulation which can be fittingly acknowledged only by the act of dedication.

Conscious of his indebtedness to those who have gone before in this important field, the author will feel that he has repaid some of his obligation if this presentation will cast the beam of light a little farther upon the road leading toward the truth about the worker at work, a road which must ever be travelled by scientist and layman walking hand in hand.

H. D. K.

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THE PSYCHOLOGY OF VOCATIONAL ADJUSTMENT

CHAPTER I

BEGINNINGS OF VOCATIONAL PSYCHOLOGY

The Psychological Problems of Vocational Adjustment.—Whereas the nineteenth century was noted for a great expansion of industrial life through the perfection of physical and mechanical factors, the twentieth century is being marked by the recognition that the physical point of view is not sufficient—that there are other factors to be taken into consideration—the so-called "human factors." By these are meant the interest with which an individual does his work; the motives that animate him; the things that may be used to make him work harder or better; the mental qualifications required for achieving success in his work; the stages through which he must pass in learning to do the work. There are a host of such factors being recognized as important in the industrial workaday world. Known for some time as human problems, they have more recently come to be designated "personnel" problems. Already numerous, they are really only a meagre part of those which, with enlarging vision and advancing technique, will ultimately be recognized.

Who Are Interested in These Problems?—Already these psychological questions have become so numerous and have ramified so widely that they have claimed the attention of an exceedingly large number and variety of persons.

Employers.—Naturally, every one who employs workers, whether he be proprietor or manager, is interested: factory superintendents, foremen, sales managers, all are coming to see that in order to secure the maximum production from their employees, even from the machines run by employees, they must recognize the psychological problems, and make some attempt to solve them. In large, well-organized business establishments there is usually a particular department that looks after the adjustments between

workers and their jobs, variously called the Employment Department, the Department of Employment Management, Personnel Department. In this department are usually several persons with some degree of psychological, sociological, or medical training, all of whom come within the range of interested persons.

Economists.—Professional economists who are seeking to formulate a theoretical basis for business relationships are also interested in the psychology of vocational adjustment, desirous, as one of them phrases it, of putting "human nature and human motives into our basic hypotheses."

Labor Organizations.—Organized labor, which has continuously waged agitation for betterment of working conditions chiefly on economic grounds, is now coming to wage it partly on psychological grounds. Unconsciously perhaps, but surely, many of the objectives of modern organized labor are directed toward an acknowledgment on the part of management of the importance of the psychological factors in work. The clearest statement of labor's interest in this direction is contained in the communication addressed by the International Bureau of Labor to the Second International Conference on Psychology Applied to Vocational Guidance and Scientific Management, held at Barcelona, Spain, September, 1922. (See Chapter Fourteen.)

Schools.—Schools are interested in this subject because they are trying to train young people for success in life. In doing this they discover that a child may experience difficulty in preparing for one kind of work, but may have greater ease in preparing for another kind of work, which makes the schools pause when dealing with each pupil, and inquire: What kind of work can we guide him into where he can most easily adjust himself?

Again, the school is trying to prepare each embryonic citizen as well as possible for the duties of life. The most pressing of these duties is the earning of a living. But before the individual can be specially trained to earn his living he must decide in what way he is going to earn it; that is, he must decide what vocation he is going to enter. Accordingly the school desires to assist him in making the decision wisely. The process of education is inevitably bound up with the problem of vocational adjustment, and so all kinds of educational institutions are interested.

Elementary Schools.—When one stops to think about it soberly, one sees that the elementary school is really not the place where the majority of people ought to make a final choice of vocation. At such an early stage they cannot know the extent of their own powers; neither can they know the breadth of vocational opportunities in the world. True, at an early age, a few children exhibit marked tendencies toward some special field, such as drawing, music, or mechanics, and make successful choices of life-work, but certainly the vast majority do not and probably ought not to do so. The elementary school cannot give them the special training required in worth-while occupations; it, therefore, ought not to be obliged to force vocational decisions.

There is one unfortunate circumstance, however, that forces the problem upon the elementary school, whether rightfully or not; it is the fact that so many children leave school after completing the eighth grade. Statistics show that at least forty per cent. leave school at this stage and go out into the world to seek an occupation. It cannot be called a vocation in the sense of a "calling." It is more often a "blind-alley" job that leads to nothing.

The elementary school cannot possibly prepare a child of 14 or 16 to be a successful worker in any occupation requiring a very high degree of skill. And it should not try to do so. In the limited time at its disposal it should first seek to prepare the pupil for the non-vocational duties of life and then lay a general foundation of rudiments upon which he can base the special training required in higher occupations.

Faced with this dilemma, the elementary school feels that it nevertheless ought to do what it can toward helping those who are leaving school at so tender an age to become adjusted to work. One of the steps it is taking is to persuade the child who contemplates leaving school to reconsider and continue his school work, which is tantamount to asking him to lay a broader foundation upon which he can build up a greater number of vocational accomplishments, and to delay his choice until he has reached the point where he can see a greater number of vocational possibilities. In addition to these efforts, which, at best,

can only be called negative vocational guidance, courses in "Occupations" are organized in the sixth, seventh, or eighth grades, in which leading occupations are studied. The attention of the child is called to his own relation to the vocational world by means of the assignment of readings and essays upon various occupations.

As was said above, upon graduation from the elementary school, a large number of children leave school. There is a popular belief that most of these are obliged to go to work in order to contribute to the support of themselves and their families. Investigation has shown, however, that economic pressure is not the necessity in most of these cases. Many of the children are merely disgusted with school. Some have eccentric abilities and tastes to which the school with its necessarily standardized curriculum does not appeal. In the case of many others the reason they desire to leave school is that they do not succeed very well in learning, especially in learning things from books. And so they think that to remain in school longer, especially to go on to high school, where the curriculum grows more and more bookish, would be not only distasteful but quite useless. In the case of many of these perhaps no effort ought to be made to keep them in school. For it must be admitted that there are an appreciable number of persons in the world whose intelligence, or, at any rate, whose ability to handle abstract ideas, is limited. They probably never could be prepared for a vocation requiring complicated thinking and long preparation. Accordingly, the elementary school may well allow these persons to leave school. Still, it does not need to give up its responsibility toward them. It, or some other agency, still faces the duty of seeing that these persons are adequately adjusted in a vocation. In some communities the effort is made to give them a type of education that they can absorb more easily. They are sent to Trade Schools or "Vocational Schools," where they are encouraged to try out several courses in which the learning is not "bookish," but more immediately "practical," perhaps manual.

In some cities, where opportunities for such trials of vocational interest and aptitude are limited—and they usually are limited, even at best—the attempt is made to furnish vocational

guidance through bureaus for counsel and placement. A central office is maintained which acts as a clearing-house through which all children must pass who desire to go to work before reaching the legal age of quitting school. Here they must show that it is necessary for them to leave school. This central office also has contact with employers who can employ juveniles, and tries to supply them with workers who will fill their specifications. It should be noted as a sad commentary upon the inadvisability of trying to find positions for children of school age that employers frequently say that they are not particular what kind of ability or training the child has, just so he will come to work on time and give an honest day's labor at wrapping bundles, running errands, and the like.

High Schools.—In high schools, the efforts toward vocational guidance consist in giving courses in "Occupations," as in the grades; in arranging trips of inspection to local business establishments; in scheduling addresses by business men and women representing various occupations; and in counselling pupils regarding their chances in various occupations. The pupils also write essays upon different occupations.

The activities described above are not, by any means, universal in elementary schools and high schools, but they are present to such an extent that of the 20,000,000 school children in the United States probably 2,000,000 or 3,000,000 are being served to some degree by them. (10) [1]

Colleges and Universities.—Important as they are in elementary and high schools, the problems of vocational adjustment press still more insistently upon institutions for higher learning. And they ought to receive especial attention in this sphere. For here are the cream of the nation, persons with the best intellects, best home background, and best chances of fitting themselves for wide service. With all these advantages this group needs vocational guidance of the most expert kind. Young men and women enter colleges and universities in great numbers with no settled vocational aim. Some of them get an aim and some of them change their aim as they progress in their college course.

[1] Numbers in parentheses refer to works listed at the end of the chapter.

For one of the great benefits of a college training is that it broadens one's view of the world, giving glimpses of vocations previously unknown. But there are a large number who do not get a vision. Upon graduation, they take the first job available, and they drift, sometimes for years, in a sea of mediocre positions. True, their drifting is probably not so aimless or so frequently disastrous as that of people without a college education. And with their superior natural abilities, these college-bred men and women make relatively successful vocational adjustments. But they make a great many blunders and waste a good deal of time, some of which could be saved by organized means of vocational adjustment.

Professional Schools.—At first glance it might appear that professional schools, by which are meant schools of engineering, law, medicine, journalism, commerce, music, dentistry, agriculture, art, and the like, do not need to exert vocational guidance, since their students have already chosen a vocation. Such a conclusion is, however, erroneous. Many of the students in a professional school give strong evidence that they would be unsuccessful in the vocation for which they are trying to fit themselves. The institution does not like to thrust them out without some training, and would like to find how best it might develop them along lines wherein they can make successful adjustment. Within any one professional field, there are several lines of activity; in engineering, for example, there are mechanical, electrical, civil, and chemical engineering. And though one might have difficulty in one of these branches he might adjust himself in one of the others with considerable ease. Furthermore, within the field of, say, electrical engineering, one may make still narrower choice; he may prepare to use his engineering training as a works manager or as a salesman of electrical goods. How to discover the aptitudes that would warrant such efforts at vocational adjustment is one of the biggest problems that confront the administrators of professional schools. The following statement, issued by the School of Engineering of Purdue University, enumerates some of the benefits which a professional school can derive from a system of organized vocational adjustment.

"Purdue University is interested in developing the character, personality, mind, and body of every student. It is impossible for the student to see himself as others see him; difficult for him to know what others find objectionable or commendable in his make-up. The Personnel System administered by the Engineering Staff of Purdue will point out these things to the student.

"It is expected that by the Senior year the Personnel Staff of Purdue University will have such an intimate idea of the student's possibilities that he can be recommended to an employer as being best suited for a particular type of work. This assures all of better satisfaction. The student will be more satisfied when engaged upon the work he likes best, for which he is best suited, and the employer will be spared the cost of time and money in experimenting to find out where the college graduate would best fit into his organization."

For all these reasons colleges of liberal arts and professional schools are exerting earnest efforts toward instituting vocational guidance. The number of institutions that are installing vocational guidance bureaus or personnel bureaus is growing at a rapid rate. Of the 500,000 college students in the country it is probable that almost a half are being touched by some form of organized vocational guidance. (10) The efforts take the form of tests, informative lectures given by successful representatives of professions, trips of inspection, and, in some cases, of arrangements whereby the student can make trial of himself in one or two fields before he is given a degree. This latter activity is especially easy of accomplishment in institutions that offer a part-time alternation of work and study, as, for example, Antioch College and the Engineering School of the University of Cincinnati.

Philanthropic Agencies.—There is a growing group of miscellaneous organizations that are engaging in the work of vocational adjustment, impelled to do so by sight of the ills attending man's unsuccessful attempts at vocational adjustment. Privately endowed bureaus, the Y. M. and Y. W. C. A., Knights of Columbus, and many other organizations are taking up the task of gathering information and devising methods that will aid individuals to become adjusted to their work. [For a list of about 200 such organizations see Thompson. (9)]

Parents.—It goes without saying that one important group concerned in the problem of vocational adjustment is composed of the parents of the rising generation. Though in the position of greatest authority, a parent usually feels himself quite unable to guide his child with respect to a life-work. For he knows that he should not force, and he would not know in what direction to force, even if he could. Parents may, however, indirectly exert great influence in assisting their children's vocational adjustment. If the parent conducts a business and if the child evinces a liking and aptitude for it, the problem solves itself. Lacking this, much may be done by holding up ideals of intellectuality or art, or whatever field seems desirable. Probably the greatest service can be rendered by seeing to it that the child always has some vocational ideal. This will not be difficult, as children, even at a very early age, like to dream about their future. The particular aim will change with growth and experience, but some aim should always be present. If it is, the problem is partially solved. To keep it there and to feed it is peculiarly the duty of parents.

Individual.—Finally there is the individual worker or worker-to-be. Harassed by doubts regarding his own powers, baffled by the multiplicity of vocational opportunities, he seizes upon the benefits potential in vocational guidance as the means of his economic and moral salvation. Indeed it seems that the whole world is interested in this problem.

History of Attempts to Solve the Problems of Vocational Adjustment.—Having had its rise and development in such diverse fields, the movement as a whole will be a little hard to trace. The main threads, however, may be discerned in industry, in the schools, and in the history of modern psychology.

Scientific Management.—Late in the nineteenth century a few industrial managers awoke to the realization that much inefficiency was present in industry. They located it in the uneconomical arrangement of machinery, wasteful handling of materials, and finally in the unsuccessfulness of the adjustment between workers and their jobs.

There were several men who saw this and began to devise means by which these inefficiencies might be eliminated. We

shall not consider here the many reforms instituted in factory organization and management. They are treated at length in books relating to the subject. What we are here interested in is the awakening to the need for recognizing the human element in business. All agree that one of the great evils of modern industry is the lack of adjustment between workers and their work. Many workers are in jobs that are distasteful or beyond their capacity, or else they are only imperfectly trained to carry on their work, and thus are working below their maximum level of efficiency.

In order to raise industrial operations to a high level of efficiency it was seen to be necessary, as Frederick W. Taylor put it, to "scientifically select and then train, teach, and develop the workman." (7) Other exponents of the same idea were Frank B. Gilbreth and Harrington Emerson. It is true that these men have been charged with preaching doctrines that neglect the welfare of the worker and make him a mere machine. Such criticisms, while possibly justly levelled against some of the imperfect followers of these great engineers cannot truthfully be brought against Taylor, Emerson, and Gilbreth. They recognized clearly the necessity for taking the worker into consideration. Time after time, Taylor insists that efficient management must regard the welfare of employer and employee as being identical. He states his aim to be the maximum prosperity for both. In describing his now classical work with pig-iron handlers he says, "Our first step was the scientific selection of the workman. In dealing with workmen under this type of management, it is an inflexible rule to talk to and deal with only one man at a time, since each workman has his own special abilities and limitations, and since we are not dealing with men in masses, but are trying to develop each individual man to his highest state of efficiency and prosperity. Our first step was to find the proper workman." (7)

Unscientific and Unsystematic Methods of Hiring.—Previous to the recognition of this principle of selective hiring most unsystematic and ineffective methods were employed. They have been aptly described by Link: "In general, the practice is to receive a number of applicants, look them over, ask them a series

of general questions, and then hire those that 'look good.' Many amusing strictures on this crude method have been written. A quotation from one of these will suffice to typify the rest: One large manufacturing establishment has appointed as monarch of the 'hiring-on window' a man who had the misfortune to lose a leg in the company's employ. As a consequence of this loss, he was given his present life job, which he performs to the queen's taste. He was induced to describe his methods, and they were something as follows: 'On Mondays I turns down all the men with white collars, on Tuesdays all with blue eyes, Wednesday all with dark eyes. Red-headed men I never hires, and there do be days when I has a grouch and hires every tenth man.'" (4)

Expansion of Employment Management.—As was said above, the early attempts at systematic vocational adjustment in industry were directed toward hiring. It was soon seen, however, that there were other important phases to observe. If the hiring was to be centralized and systematized so also should be the firing. Under the old system many evil practices existed. A foreman might discharge a competent workman merely because he did not like his religion or his politics. Accordingly it was seen to be necessary that the "employment" department should be entrusted with the power to discharge. Further, when a worker was to be transferred from one department to another the logical route was through the employment department. The growing interest in the systematic study of the human side of industry came to a head during the World War. In the army it was seen that soldiers served better if they were in a branch of the service to which they could easily adjust themselves. In the factories engaged in making materials useful in winning the war the necessity was also apparent for attuning workers to their jobs. Efforts to facilitate such adjustment came to be designated as "personnel" work. And the personnel department took on a number of added functions—promotion, training, research, etc. A complete list cannot be attempted here, but it would include such things as medical and dental service, legal aid, housing, thrift, athletics, and the like.

The Profession of Personnel Director.—With all this expansion of duties, the employment department, now known as the personnel department, became one of the most important divisions of the organization, and the head of the department, called the Personnel Director, became a most important executive. He is now regarded as one to recommend policies regarding the arrangement of work, the kind of persons who should be employed, and the provisions that should be made for their welfare in large and small ways. As time goes on his position takes on larger and larger dimensions. He is really the connecting link between the management and the workers. He must interpret the one to the other.

The Personnel Director, a Vocational Counsellor.—When his work was first being visualized the Personnel Director was thought to have responsibility chiefly toward the employer—the responsibility of selecting the fittest possible workers and keeping them productively at work. As his task appears in the light of a broader social vision, however, it is seen to involve responsibilities to the worker as well. While on behalf of the employer the Personnel Director should carry on vocational *selection,* which is the selecting of the most valuable employee for the job, on behalf of the worker the Personnel Director should carry on vocational *guidance.* In accepting an applicant for employment he assumes forthwith a responsibility for the vocational welfare of that worker; to place him in a position worthy of his powers, suitable to his limitations, akin to his interests, congenial to his habits and tastes.

With this thought in mind progressive personnel directors are evolving measures aimed at the welfare of the individual. When interviewing an applicant they inquire carefully into his past, not merely in order to safeguard the interests of the firm, but also in order to be able to advise the applicant whether his experiences will give him advantageous standing in the firm. They inquire into his interests, tastes, and ambitions in order to place him in harmony with them. After hiring him they keep records of his productivity and progress, not merely in order to reward him proportionately, but also in order to advise him when he may profitably aspire to a more responsible position. They keep an

eye on his morale, frequently taking his psychic pulse, as it were, in order to transfer him when advisable to another department. It is becoming increasingly common for the personnel manager to inform employees that the firm is ready to entertain requests for transfer if the employees can make themselves more efficient in another department. Finally must be mentioned the educational service. When an employee is found to have leanings toward a job for which he has some qualifications but lacks training, the Personnel Director promptly refers him to the educational facilities of the firm, by means of which he can study.

National Organization of Personnel Directors.—A further sign of the professional status of personnel directors is the fact that they have formed organizations for the purpose of discovering better methods of performing their duties. In the large cities they have organized groups, some of which still go under the pre-war appellation of Employment Managers' Associations, though the national organization is called the American Management Association. Another national organization called the Personnel Research Federation strives likewise for recognition of the professional status of the Personnel Director, emphasizing particularly his duties as an assembler of information about workers.

The Vocational Guidance Movement.—While these movements have been taking place in industry there have been other forces calling for a psychological approach to vocational adjustment. One is the movement called vocational guidance. It was started in Boston with Professor Frank Parsons of Boston University. He saw that there were hundreds of young men in his vicinity who desired guidance in choosing their vocations. Accordingly, he opened his office to them and, after listening to a recital of their problems, he gave what advice he could. So dire seemed the need that he conceived the idea of opening up offices everywhere, manning them with competent persons, and trying in a systematic way to give assistance to the growing youth of the coming generation through what he called vocational guidance. Since the opening of his office in 1908, the idea has spread until today there are vocational-guidance offices in nearly all large cities. (6)

Vocational Guidance and the Public School.—It was early seen that vocational guidance must keep close to the public schools, which contain the raw materials in need of guidance. Accordingly many vocational-guidance offices, for example, those in Chicago, Cincinnati, Detroit, Pittsburgh, have been organized within the public schools; on the hypothesis that if every child now in school could be directed toward some vocation for which he manifests interest and aptitude all the members of society within a generation would be properly adjusted to their vocations. More and more experience shows, however, that vocational guidance cannot operate exclusively in the schools. There are many adults, already at work, who are vocationally misplaced. Moreover, as we shall show in a later chapter, even though a person might become well adjusted to one vocation, he should not necessarily be regarded as limited to it for the rest of his life. He might develop interest and acquire abilities that would fit him equally well for another line of work. Indeed, the changing conditions of the world force the individual who desires to keep abreast of it to make vocational adjustments from time to time. For these and other reasons it is evident that vocational guidance cannot be carried on exclusively in schools. It should really be a continuous factor in the life of every individual. With this mention of the movement known as vocational guidance we acknowledge the large part it is playing among the forces that make for effective vocational adjustment. We shall treat its specific contributions with greater particularity in succeeding chapters. (2)

Development of the Science of Psychology.—A fourth factor in the solution of the psychological problems of vocational adjustment was the growth of the science of psychology. It is only a young entrant into the field of the sciences. As a laboratory science it dates only from 1878, when the first laboratory for experimental psychology was established at Leipsig, Germany. Its growth in America may be estimated from the fact that the American Psychological Association, which was organized in 1894 by a few dozen young men devoted to the upbuilding of the science, now (1925) numbers 500 members.

Simultaneously with this numerical increase among psychol-

ogists arose in the minds of some of them the desire to apply their science to problems of every-day life, particularly the problems of vocational adjustment. One of the most outstanding members of this group was Hugo Münsterberg, who published several volumes under such novel and thought-provoking titles as Psychology and Industrial Efficiency, Vocation and Learning, Psycho-Therapy, Business Psychology. Münsterberg conducted a number of experiments in the field, but they were not very conclusive. His chief contribution was that of a prophet, arousing the public to a realization of the service that psychology might render. (5)

Meanwhile other psychologists had been experimenting. A pioneer investigation was that made by William Lowe Bryan. With an assistant who was a trained telegrapher, Doctor Bryan undertook a scientific study of the processes involved in learning the occupation of telegraphy. He studied a number of learners at the telegraph key, measured their progress in learning to receive and send messages, and discovered facts of deep significance to occupational learning. (3) Another occupation attacked in those early days was typewriting, which was investigated by Dr. William F. Book by means of a technique similar to that of Doctor Bryan. (1) For many years Dr. Carl E. Seashore worked in his laboratory at the State University of Iowa, searching for the factors that make for success in the field of music, particularly vocal music. Though begun a quarter of a century ago, his results were brought to fruition only recently; they will be treated in greater detail in Chapter Seven.

Despite these excellent patterns for vocational psychology, the science of psychology did not play much part in practical vocational adjustment. This was due partly to the fact that the working world did not know of its existence, but chiefly to the fact that the science itself was only finding its feet and developing a technique that would be applicable in practical affairs.

Personnel Psychology in the War.—That which served to bring the science of psychology more closely to the problems of vocational adjustment was the crisis of the World War, when the very lives of citizens depended on having every person in the

right job. The science of psychology was called upon for assistance. (8) It responded with methods that were found practical and effective, and it developed them to such an extent that by the time the war ended there emerged a very respectable body of knowledge called personnel psychology, which is recognized to have a large and important place in civilian occupational life. Its contributions are connected chiefly with mental tests, the selection of employees, and the analysis of occupational tasks. It should be understood that these are not the only forms in which the science may be applied, they are simply the ones at present most prominent. It is quite likely that as time goes on and as the science of psychology grows, contributions of other kinds will evolve.

Modern Psychology not Speculative but Factual.—There is one thing more that should have room in this preliminary statement. In applying psychology to the problems of vocational adjustment we do not pursue a method of mysterious divination or necromancy. Instead we push our inquiries with the strictest adherence to scientific method. Psychology is a science, defined technically as the "science which aims to describe and explain the conduct of living creatures." In saying it is the science by which we are seeking to describe and explain the conduct of workers, which is really the task before us in this book, we mean that psychology employs the method common to all sciences—experiment. It also employs the method of observation, tabulating occurrences, and describing them in quantitative as well as qualitative terms. These methods, well recognized as parts of the technique of the older sciences, such as physics and chemistry, are rigidly employed in modern psychology. In applying psychology to the field of vocational adjustment we first state a problem, then arrange conditions so that we can isolate, repeat, and vary the one factor we are investigating. (This arrangement of conditions can most easily be effected in the laboratory, and so we try to solve some of our problems by laboratory investigation. Laboratory surroundings are sometimes too artificial, however, and so we are frequently obliged to go into the factory, the sales territory, or wherever workers are engaged, and make our investigations there.) Whatever be

the particular conditions, we concentrate on a single factor at a time. We carefully observe what occurs under the conditions of our investigation, observing not once but many times, so as to reduce errors of observation and chance to a minimum. Then we record the results of our observations, expressing them wherever possible in quantitative terms. We collate our figures into tables and graphs so that they may stand out clearly, then we interpret our results and draw conclusions.

From this brief description of the methods employed by modern psychology we see that to psychologize about problems of vocational adjustment does not consist, as is popularly supposed, in sitting in an arm-chair and giving vocational prescriptions in an authoritative tone of voice. Instead we eschew opinion and speculation and search for facts. These we obtain by the arduous method of investigation just described. Only in this way can we give psychology the status of a science, which in its etymological sense is knowledge. It is our purpose in this book to bring together examples of applications of scientific psychology; to formulate new problems that should be attacked; and to outline some of the steps that may be taken in solving them.

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CHAPTER II

SIGNS OF VOCATIONAL MALADJUSTMENT

Number and Variety of Signs.—Little argument is needed to prove that there are many people who are not well adjusted to their work. Evidences of various kinds abound in all fields of work.

Poor Work.—Inefficiency is rife. Some of it can unquestionably be traced to defects in materials and in mechanical processes. Much of it, however, is coming to be recognized as traceable primarily to human errors arising from the fact that many workers are ill adapted to their work. The moment one takes records of the output of individual workers one sees the number who are below par. Their inefficiency may express itself in terms of deficiency of quantity, quality, or both. On page 56 are the commissions earned by 100 salesmen of a nationally known product. The one who earned the largest amount, $20,429, earned eight times as much as the one at the bottom of the list, who earned only $2536. Another series of figures showing differences in output are presented below. They consist of the records of forty printers (hand compositors) expressed in terms of per cent. of a certain standard of efficiency in which both quantity and quality of work are weighed. The important thing to note is the variation in output. Whereas one man, compositor XL, produced only 51 units, compositor I produced 149 units, or almost three times as much. These differences cannot be due to differences in experience, since compositor XL had five years' experience, and so had compositor III, who produced more than twice as much. Compositor XXXVIII, with six years of experience, turned out only about half as much as compositor II, with the same amount of experience. The conclusion is forced that probably the chief reason for such differences is that some of the workers were not well adjusted to the work.

TABLE I

Compositor	Unit of output
I	149
II	138
III	128
IV	119
V	119
VI	118
VII	118
VIII	115
IX	115
X	110
XI	110
XII	110
XIII	104
XIV	104
XV	104
XVI	102
XVII	101
XVIII	100
XIX	100
XX	99
XXI	98
XXII	97
XXIII	92
XXIV	91
XXV	90
XXVI	90
XXVII	89
XXVIII	88
XXIX	87
XXX	86
XXXI	82
XXXII	79
XXXIII	79
XXXIV	78
XXXV	74
XXXVI	72
XXXVII	71
XXXVIII	70
XXXIX	63
XL	51

Accidents.—Other evidences of inaptness are the large number of accidents that befall certain workers. It was long ago recognized that many accidents in shipping and railway transportation service were the results of defects in workers who were unable to distinguish the colors of signals. And one step toward scientific vocational adjustment was taken when tests for eye-

sight were arranged for workers on railways and ships. There are, however, other defects which may make certain workers uncommonly subject to accidents. Some workers chronically have accidents. An investigation in a British factory showed that of 29 persons having accidents within a three months' period, 10, or 34 per cent., had three or more accidents. Stated in another way, of 68 accidents among these 29 persons, 42, or 64 per cent., were caused by one group of 10 persons, or 34 per cent. of the workers. These were not inexperienced workers, for they had been employed in the plant eight months or more. The conclusion seems to be inevitable that they were merely persons who were unusually susceptible to accidents on the jobs at which they were working, and hence were, in this respect at least, unsuited to the jobs. (2)

Recognition of the prevalence of this condition led Münsterberg as early as 1907 to endeavor to devise tests that would indicate a man's fitness to be a street-car motorman. Following out the suggestions he made, the managers of the street railways companies of Berlin put into operation an elaborate system of tests. As a result they report that they have reduced considerably the accidents due to ineptitude of motormen. (See Chapter Fourteen.)

It is quite certain that a large number of occupational accidents come from faulty adjustment between the worker and his work. The proportion due to this cause may be estimated from figures in Chapter Three, showing the number of accidents occurring to new men in four factories. The significant thing here is that the accidents happened with great frequency in the period when the new men had not yet had time to become adjusted to the occupation as well as to their job. Among workers who are new ("green" is the word commonly used) not only to the job but to the occupation, and among those who are always in that "new" condition due to constitutional unfitness, the likelihood of accidents is greatly increased.

Lack of Interest.—For millions of generations—ever since the Eden episode—a great part of mankind has regarded work as a curse; has been uninterested in it and has tried to avoid it. Fortunately for the progress and happiness of society this atti-

tude is not present in all human beings. Many exhibit the liveliest possible interest in their work. (They are probably the successfully adjusted ones. We shall discuss the relation between success and interest in Chapter Eight.) Still there are many who are only half interested, if not utterly unhappy, in their work. These, we can safely assert, are not well adjusted to it. Either they are not adjusted to the general vocational field in which they are working, or they are not adjusted to their particular job within the field. Granting this unfortunate prevalence of lack of interest we face the question: How can a person be made interested in his work? This is a psychological question which can be answered only by a thorough discussion of interest.

Definition of Interest.—Let us first describe the psychological phenomenon we are talking about. It has been given several definitions: "Interest is the recognition of a thing which has been vitally connected with experience before—a thing recognized as old." "Interest is the impulse to attend." "Interest naturally arouses tendencies to act." "The attitude of interest is not 'What is it?' or 'Who goes there?' but 'What is to be done?'" "The root idea of the term seems to be that of being engaged, engrossed, or entirely taken up with some activity because of its recognized worth. The etymology of the term *inter esse,* 'to be between,' points in the same direction. Interest marks the annihilation of the distance between the person and the materials and results of his action; it is the sign of their organic union." (1)

Characteristics of Interest.—(a) Concentration of attention. Interest is easy to identify in occupational life by the extent to which the individual identifies himself with his work. He regards it as a veritable part of himself. Watch a master violinist performing. He is completely absorbed in his playing, with a concentration of attention that shuts out everything else. He narrows down his movements to only those connected with his playing. Even his breathing and pulse-rate partake. The same attitude may be observed in a cabinet-maker or any other workman who really loves his work.

(b) Pleasant feeling. Besides this characteristically close concentration of attention should be noted another phenomenon of

occupational interest—a strong feeling of pleasure in doing the work. The pleasure constitutes a glow of feeling that suffuses the entire organism. And this feeling gives increased efficiency to the worker. The muscles probably have a higher degree of tonicity (readiness to act), and the nerve currents mediating thought and action probably flow more freely.

Source of Interest.—If the man on the street should be asked where interest comes from, he would probably look puzzled for a moment, and then reply that he supposes it is inherited. For there is an idea abroad that interests are inborn, that a man is interested in an occupation because he was created with a predisposition in that direction. Expressions like these are common: "My father never could get mathematics, and I can't either." "I am a born Republican." "Johnny was born with an interest in machinery."

Now while tendencies to manifest interest in certain objects may be inherited, the objects are of simple sorts such as an intense light, a loud sound, a moving object. These things are elements or qualities of objects, not the objects themselves. Especially is it impossible to inherit interest in such complex things as the manufacture of automobiles or the selling of drugs. James goes so far as to assert: "The objects of professional interests are most of them in their original nature repulsive." "An adult man's interests are almost every one of them intensely artificial; they have been slowly built up." (3)

Not only does the psychologist affirm that occupational interests are acquired through experience; he goes further and declares that the particular occupational interest of any man might have been cultivated in widely different fields. "Any object not interesting in itself may become interesting." A golf enthusiast might have become just as deeply interested in horseback riding; a specialist in Early Victorian Literature might just as readily have developed an interest in chess; a manufacturer of saw-mill machinery might have cultivated an interest in rum-running. He need only to have been subjected at the proper time to the appropriate stimulations.

Accordingly, the business executive wishing to inculcate within his employees a warmer interest in their work may take

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heart. Parents who desire to direct the interests of their children toward worthy vocational ends may consider the task feasible. Individuals who would like to develop interests in some particular occupational field may regard it as a possible achievement. The question now arises: How can interest be cultivated?

How to Develop a Vocational Interest.—It should be understood that a definite campaign must be waged. The business executive, parent, or worker must set out consciously to woo interest. Two rules may be applied: First, *In order to arouse interest in an occupation give information about it.* If one examines a fully developed interest of an individual, say an interest in base-ball, one finds it to consist of a large mass of information about the game. The mind of the base-ball fan is crammed full of facts—the standing of each team in each league, the batting average of each player, the intimate details about the game at Cleveland last week. All this information extending back several years is catalogued in his mind ready to be compared with today's results. That is why he awaits the news of this afternoon's game with such keen interest.

This principle will work in the same way with an occupation. Tell the worker many things about the object he is working on. He is likely to be ignorant about it. Because of the highly specialized division of labor he seldom sees the results of his work in a finished condition. He needs then to know the relation of his part to the whole before he can be very greatly interested in it. How much richer will be the work of an intelligent textile worker if he knows something about the invention of the cotton-gin, the way cotton is grown, the differences between the various grades of cotton, the reasons therefor and the uses to which each grade may be put. How much more interestedly will the young saleswoman at the glove counter sell gloves if she is informed about the different skins that go into the gloves she sells, the kind of skin that is most suitable for each kind of glove, the grades of leather, the processes of tanning. Figures showing the beneficial results derived from giving information to employees of one company are presented in Chapter Eleven.

Company Morale as a Form of Interest.—In addition to the interest in the product there may be developed within the worker a warm interest in the establishment where he works. This is often called company morale, and is one of the most highly prized assets of an employing firm. How to develop it is one of the most perplexing problems facing employers. The answer is bound to come in psychological terms, since morale is essentially a psychological entity. For this very reason it is difficult to describe. Perhaps its nature can better be indicated in terms of its characteristics.

Characteristics of Morale.—(a) It has at its core a central idea. Sometimes it is embodied in a company slogan, such as "The World's Greatest Newspaper," "Harmony in the factory makes harmony in the piano." Whatever it is, it represents a goal toward which all the workers may direct their thoughts and actions. (b) It consists of confidence in the leaders, in a respect and liking for the proprietors and executives, sometimes amounting to real affection. (c) Morale, if it really is morale, affects the will. It seeks expression not in mere feeling, but in doing. For example, the high morale of the American soldiers in the World War was evident in the impatience they manifested when being kept away from the front. They burned to express their zeal in action. (d) Morale is preëminently a social thing. It thrives best in groups. In this social situation it possesses two characteristics of great significance: It is very infectious. One member of a group with a high degree of morale can quickly infect others. This principle was utilized in the formation of the draft army of the United States. In each of the new units made up of untried recruits, there were placed one or more long-tried soldiers from the regular army—already imbued with the idea of service to the country, and possessed of high morale. By their mere example they transmitted the trait to the other members of the unit. So in an industrial group, one loyal worker may have a strong influence in making others loyal.

Paradoxical as it may seem, morale is also very volatile. Just as it may be readily aroused within the members of a group so may it be as quickly dissipated, the degeneration passing from one man to another. Its rise and fall is mercuric. It may be

high one moment and low another. It is well known that even so ephemeral a thing as a full meal may raise the morale of a company of soldiers. So in industry, a very slight thing, such as withholding the pay over two weeks instead of one, may lower the morale markedly.

Measures of Morale.—If morale is so powerful a force in occupational life, and especially in group occupational life such as that found in industrial establishments, it would seem to be susceptible to measurement. The method used would have to be indirect, and based on the *expressions* of morale. There are several of these that might be used. One is production. When morale is high, production is good; when morale is low, production is poor.

Again, the strength of morale may be judged from the turnover. In a plant where the morale is high, the turnover is bound to be lower than in a plant where the morale is low. A good example of what morale can do to increase the length of service of employees may be seen in Fig. 6, p. 43, showing the number of weeks served by employees in four different metal manufacturing establishments. Company A is known to have unusually high morale among its employees; and the fact is manifest in the notably longer time they remain with the firm.

Again the state of morale may be indicated in terms of the number of absences. When morale is low, the employee says to himself, "I will not bother to go to work today." When it is high, however, he reflects how his absence will disorganize his department and so he comes to work. Tardiness may serve similarly as an index. The number of complaints may also serve to denote the state of the morale. The greater the number, the lower the state of morale. Likewise in organizations where there is a system of "suggestion-boxes," the greater the number of suggestions looking toward the betterment of conditions, the higher the morale. It is probable that other expressions of morale may serve as measures, and there is strong likelihood that business executives will devise methods of utilizing them and of preparing barometers for the measurement of the morale of their employees.

Stimulating Morale through "Welfare."—In the attempt to induce the kind of interest that will generate high morale,

employers have generally installed expedients known as "welfare work," consisting of home visiting, forms of recreation, etc. And they think that they have taken very advanced steps toward stimulating the interests of the employees in their work and in the company. While we do not decry such efforts, we suggest that a more important way to make an employee interested in his work and in the organization of which he is a part is to improve his facilities *for doing the work;* to give him the best possible conditions with respect to lighting, ventilation, hours, overseers, methods of wage-payment, etc. Only after improving working conditions to the highest possible degree are extraneous "welfare" activities effective in maintaining high morale.

How to Induce Loyalty to the Company.—In order to develop company loyalty one may give information about the firm. One company carried this into effect by presenting a drama at one of the regular "get-togethers" of the employees, in which the early history of the firm was depicted. The characters of the founders were assumed by workers, and the parts of some of the pioneer employees who were still with the firm were taken by themselves. The sketch was so well received that it was written out in a booklet, as a plant history, including biographical sketches of the founders and of employees of long standing. This booklet is presented to every employee on his first day of employment, and it does much to enlist his interest in the firm.

It goes without saying that whatever use is made of the psychological principles of interest must be well planned and definite. It must be delegated to some specific agency within the organization. If a corporation school is maintained for giving instruction in spelling, history, and the like it may well include courses in industrial history and industrial biography, even elementary economics. The dissemination of information may be delegated to some department like Welfare, Research, House Organ, or preferably, Personnel. Its head will be a "morale officer" with duties frankly those of a press-agent—to propagate information about the firm and its affairs among the employees—working through all departments and agencies: library, house organ, directorates of employee associations, athletic clubs, and the like.

In applying the psychological principle of giving information about the product and the firm, one essential must be kept in mind; the new must be stated in terms already interesting to the employee. One interest that is always present in the mind of the employee is interest in his pay. In relating it to the interests of the firm the employer must show the employee that as he works to increase the profits of the firm he is directly augmenting his own earnings. The demonstration of this must be apparent, concrete, in terms of the pay envelope, and immediate. Its form will depend on the system of profit-sharing in operation. An illustration of the force of such incentive is furnished in Figure 12, page 162, showing the increase in output brought about by the application of a stimulus among a group of printers. The output rose in five months from an average of 59 units to 97 units—an increase amounting to 61 per cent.

Second Rule for Development of Interest.—To give information is not the only psychological means of generating vocational interest. There is still another way: *In order to evoke interest in a type of work, arouse activity toward it.* This principle is habitually employed by clubs, churches, colleges, and philanthropic institutions, who choose as members of the Board of Directors persons in whom they wish particularly to arouse interest. The victim is first elected a member of the Board. Then he is placed on an important committee, like Ways and Means. In trying to solve the problems of the exchequer he becomes more and more deeply interested, finally making the financial contribution that every one hoped he would make.

The same tactics may be employed in an industrial concern by an employer who desires to inculcate stronger interests within his employees. The following incident shows how one manager proceeds to develop interest within a certain type of man. Job Grimson was a dapper youngster of considerable intelligence, but so inordinately fond of himself that he never became greatly interested in the affairs of the firm. The manager was sure Job could become a useful employee if he could transfer that self-interest to the company's product. One day, noticing how Job strutted past the stenographer's cage, he got an idea. Calling him from his preening, he asked him how he would like to be reception

executive, his duties being to take visitors over the establishment and explain the product. Job expanded to the idea. He gladly undertook a course of instruction that would fit him for the job, and nosed into odd corners collecting information with great avidity. When he had absorbed a sufficient amount of information he was permitted to take his first visitors through the plant. He did it gracefully and effectively, as the manager had anticipated. And the desired result followed. For as he dilated upon the economical methods of handling raw material, the efficient routing system, the new machine that did the work of three men, and the number of cars loaded daily, he began to act as though it were his personal property he was exhibiting. Indeed he developed the habit of looking upon the entire plant as his. This was the very attitude the manager wished to encourage, and it resulted in winning for Job a responsible managerial position. The device proved so valuable in Job's case that it was permanently adopted, and has raised the work of many a young fellow from a level of indifference to one of enthusiastic coöperation.

There is one thing that must be kept in mind. There are, and always will be, certain jobs in the world that are monotonous and hard to become interested in. Particularly true is this in these days of minute division of labor and high specialization of operation. Of late years, however, opportunities have been opened in many establishments whereby workers are stimulated to invent and, in the capacity of shop committees, to help plan and manage. Coördinate with these arrangements go opportunities for workers to share in profits. Under these conditions the worker has great stimulants to his interest and can become interested in even the monotonous parts of his work. There is almost no work that is free from some monotonous features. Interest can be developed, however, so that the monotony will be tolerated for the sake of the larger ends.

This discussion has shown that one sign of maladjustment is lack of interest. The remedy, as we have seen, is not to bewail the lack of interest and consider it as irremediable, but to develop interest by following two principles: give information and arouse activity.

Benefits Coming from Interest.—A word remains to be said about the benefits coming from the development of interest in one's vocation. They are evident enough to the employer, consisting as they do of more and better work and increased profits. But they are even more impressive upon the worker himself. In material form they consist of increased earnings and better living conditions. Above this, however, are intellectual and spiritual rewards. Without interest a worker is a slave, a drudge; with it a god, a creator. Touched by the galvanic spark of interest, he sees new significance in his work; he relates his job to the great forces driving the universe. As his vision enlarges, his appreciation of his own task deepens, and he performs it not as a prisoner weighted down by ball and chain, but as a sculptor, lovingly fashioning his masterpiece. The sculptor conceives and holds in his mind's eye the image of a completed work. He realizes that to bring it to actuality he must go through a series of intervening steps, none of them equivalent to the end and every one of them demanding labor and patience on his part. But because he sees their relation to the end, he regards them of great importance and takes joy in doing them well. Each mold of the clay, each stroke of the chisel, receives his most painstaking care. All the interest attached to the end is attached to each step, which must be done right to produce a perfect whole. And so the accomplishment of each detail brings ineffable satisfaction because it represents the end in process of realization. (1) Such is the mental attitude in which the interested workman will perform his task. And in the beneficent results both employer and employee will share.

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CHAPTER III

CHANGES OF VOCATION AND LABOR TURNOVER

Frequency of Changes.—In continuation of our search for signs of vocational maladjustment we must direct our attention to the frequent changes made by workers. That they are frequent will be readily admitted. Exactly how frequent, though, is difficult to determine at this early stage the development of personnel work. Some quantitative estimates made in Germany show that in that country three or four per cent. of the workers change their occupation annually. The Employment Exchange for the Department of the Seine, France, reports that eleven per cent. of its applicants changed one or more times in 1919. (11) The corresponding figures would probably be much larger in the United States, with its greater fluidity of labor and greater occupational opportunity. Scott and Clothier found, in one firm, that of 79 employees considered, 52 had been with the company from one to nine years, while only 27 had served 10 to 18 years. (19) These terms of service are much longer than usual, however. Brissenden and Frankel found that of the hundreds of thousands of employees whose records they studied, 52 per cent. left their jobs at the end of the first three months. (3)

Measurement of Labor Turnover.—Before attempting to measure the extent of vocational changes we should distinguish between the two expressions of occupational instability—change of job within a vocational field, and change of vocation.

The first, commonly called labor turnover, has been the subject of much recent investigation. Recognizing its great economic importance, all apart from its psychological bearings, up-to-date business establishments are seeking to measure it and to control it. In an employing organization its investigation is usually delegated to the Employment or Personnel Department which regards the turnover, in its rise and fall, as a sort of barometer indicating the efficiency of the personnel system. When it falls,

conditions are considered to be good, when it rises, they are generally considered to be in need of adjustment.

The amount of labor turnover in an establishment is indicated by a single figure called the index of turnover. It consists of a per cent., computed by dividing the number of employees who terminate their employment during a given period by the average number on the force throughout that period. (The period considered may be a year, a month, or a week.) For example, if a concern employing on the average 1000 workers through a month loses none, the turnover is zero. If it loses 50 employees, whom it must replace in order to keep the average force at 1000, its turnover index is 50 divided by 1000, or five per cent. for the month. If, in order to maintain an average force of 1000 employees throughout a year, it is obliged to replace 500 terminations, the turnover index *for the year* would be 500 divided by 1000, or fifty per cent.

Complications Involved in Figuring Turnover.—In actual practice the computation of the index of turnover is not so simple as these examples would indicate. There are usually certain irregularities involved. Some employees do not leave outright, but "lay off" for a short period because of illness, slack work, or other cause. Some die. Some do not leave the establishment, but transfer from one department to another. On the theory that these persons who do not leave the plant outright and permanently should be handled statistically in a manner somewhat different from that in which the straight "quits" or discharges are handled, attempts have been made to modify the simple formula described above by subtracting the number of unavoidable changes from the total number of terminations before dividing by the average working force. For a summary of the methods used in figuring labor turnover see Lytle (13), who concludes: "It would seem that the most generally satisfactory definition for the future will be one that uses the replacements rather than gross separations, deducts all recognizably unavoidable separations, and takes the actual working force for the denominator." See also Brissenden and Frankel, who suggest: "As to the relatively more variable factor—the ebb and flow of industrial labor—it is suggested that it be measured by

(a) making use of accessions as well as separations, (b) from the relation between these two more or less accurately gauging the replacements, and (c) adding accessions to separations, thus showing the labor flux. . . . As to the relatively constant factor, or base—the normal or standard working force—it is proposed to use, instead of the average number on the pay-roll, the number of 3000-hour (or 300-ten-hour-day) workers to which the total hours (or days) put in during the period are calculated to be equivalent. This number may be derived from the labor-time records or, failing such records, the daily attendance records or wages and salary-account records, as explained in another section of this chapter. This standard base will be called for convenience 'the equivalent full-year worker' or, more briefly, 'the full-year worker.' . . . It is then proposed, in place of the rate of gross separation per 100 in attendance or the rate of gross accession per 100 on the pay-roll (both so-called 'turnover percentages'), to use as a double index of the shifting involved in labor maintenance and of the extent, as well, of labor increase and labor curtailment, the rates of accession and separation per equivalent full-year worker, and as an index to the general stability situation the total labor flux rate per full-year worker, the 'full-year worker' being a standard unit, the number of which is obtained by dividing the total number of hours (or days) worked during the period considered by the 3000 hours (or 300 days) of a standard working year. The rate is arrived at by dividing the number of labor changes (of whatever kind) by the number of 'full-year workers.'" (3)

Size of Labor Turnover.—As said before, employers and society at large have a vital interest in labor turnover because of the waste it entails. As would be expected, it varies according to many factors. To show the differences among occupations, Schlichter cites a yearly turnover of 236 per cent. in the seasonal cloak, suit, and skirt industry, almost four times as large as the turnover of 66 per cent. in street railway companies. Even in the same occupational field, the turnover varies. For example, among the different classes of railway employees, the turnover varies from 199 per cent. among the relatively unskilled workers on maintenance of way and structures, to only four per cent.

among engineers and conductors. (18) As an example of the difference due to changing economic conditions Brissenden and Frankel cite a turnover index of .99 in the relatively stable period 1913–14, and a corresponding index of 2.01 during the booming war period of 1917–18. Probably 100 per cent. is at the present writing not too large. This does not mean, however, that managers should sit by complacently and view this figure as inevitable. Rowntree, after describing the methods of forestalling industrial discontent used in his factory (England), says that a turnover of 13 per cent. is unnecessarily high. And one cannot point in extenuation to differences between conditions in England and America, for there is at least one set of American figures that are no higher than this. "The report of the U. S. Commissioner of Patents for the calendar year 1921 says the labor turnover of 16 per cent. in the patent office is so far above normal as to undermine the morale of the working force, with the result that the work is done poorly and less efficiently. In the clerical force, averaging 438½ employees that year, the deaths were 4, retirements 10, and resignations 93. In the technical force, numbering about 437 examiners, the deaths were 3, retirements 4, and resignations 48. Any one familiar with the work of the patent office readily admits that the recent turnover in the technical force has produced results little short of disastrous. Yet that turnover has been less than 12 per cent. Attorneys having business with the patent office seem to be agreed that bringing down the technical force turnover to a normal figure, say 5 or 6 per cent., will restore *esprit de corps* to the force, and as a result will be much more satisfactory." (17) Benge reports a manufacturing company which reduced its turnover from 150 per cent. in 1910 to 33 per cent. in 1914, at the same time lowering its manufacturing cost by 10 per cent. and increasing its production by 42 per cent. (1)

Not All Turnover is Wasteful.—Though turnover is rightly regarded as one sign of vocational maladjustment, and thus to be deplored, it should not be regarded as an unmitigated evil. Though from the standpoint of the employer it seems wasteful that workers should change from one firm to another, still from the standpoint of the worker a certain amount of change may

denote healthful growth. The welfare of the worker demands that he advance as rapidly as his development permits. And if there is not room for him to advance in the concern where he is employed he ought, for his own sake, to leave and go elsewhere. The significance of this will be shown more clearly in another connection.

Costs of Turnover.—Regardless of the possible benefits to the workers, labor turnover is costly to management; how costly is only slowly coming to be realized. In department-store management, for example, it has been estimated that the cost involved in losing and replacing a salesperson is on the average about $40. A store that loses 1000 salespersons in a year, then, loses $40,000, a sum large enough to make turnover loom up as an impressive problem. The chief items of cost may be classified under several heads:

Instruction.—When a worker leaves his job he must be replaced by another. In a well-established trade the new employee may know how to do the work and so may require little instruction. But in many lines of work, to lose an employee means that a "green" man must be instructed, or, as they say, "broken in." There must be some one to instruct him. In some establishments there are persons whose sole duty it is to instruct the newcomers. Their time costs money, which should be charged to turnover. In an establishment where there is no special instructor, the new man must still be instructed, either by the foreman or by another employee. The time of these persons costs money, which should be charged to turnover.

Lowered Production.—While the new worker is learning the job he naturally cannot do so much work as his experienced predecessor, consequently the company loses money in lowered output. Even where the new employee is thoroughly experienced, he usually does not produce much during his first period of adjustment in a plant, for the lay-out is strange and other factors require some time for adjustment.

Spoiled Work.—Parallel with the diminished quantity of work goes a drop in quality; the spoiled work turned out by new employees constitutes a tremendous item in the cost of turnover.

Damage to Equipment.—In the course of the above-mentioned occurrences come many breakages of equipment—split saws, burned-out bearings, broken fly-wheels, broken belts—all of which should be charged to the pervasive effect of labor turnover.

Higher Accident Rate.—One of the most important and, strangely, the most neglected effects of high labor turnover is a high accident rate. Careful analysis of accidents in industrial concerns shows that an appalling number of them are due to the "greenness" of newly hired workers. In investigating accidents in the iron and steel industry, Chaney found that the accident rate for employees with less than six months' service was 37.1 (per 1,000,000 hours' exposure), for those with three to five years was but 14.1, and for those with 10 to 15 years' service, only 2.8. (5)

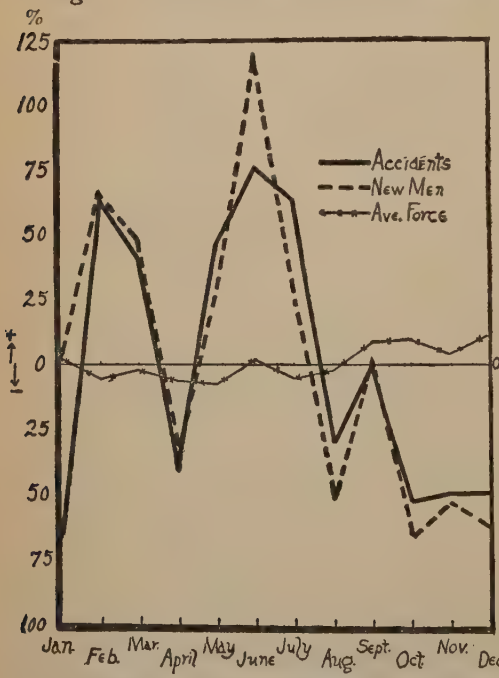

FIG. 1.—Showing (in percentages) the monthly deviations from the average of new employees hired, accidents, and working force, for Company A. Courtesy of *The Journal of Industrial Hygiene.*

With the kind coöperation of several large industrial concerns, the author secured data on nearly thirty thousand accidents in various kinds of industries which permit a new view of the enormity of the effect of labor turnover upon accidents. Homogeneous data for the year 1921 were secured from four firms: Company A, manufacturing cutlery; Company B, railway

cars; Company C, coke and gas; and Company D, automobiles. The information covered the average number of employees each month, the number of new employees hired, and the number of accidents, thus furnishing a basis for comparisons between these several factors. Complete data are given in Table II. Graphic presentation is offered in Figures 1 to 5, which are constructed on a percentage basis. The monthly averages throughout the year for the total number of employees, the number of new employees, and the number of accidents were computed, and the monthly deviations expressed in terms of percentage above and below the average.

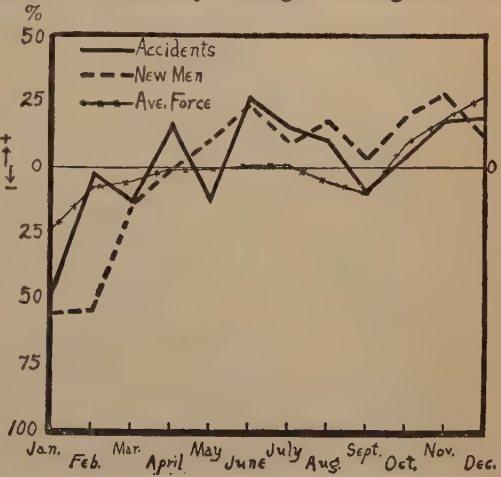

FIG. 2.—Showing (in percentages) the monthly deviations from average of new employees hired, accidents, and working force, for Company B. Courtesy of *The Journal of Industrial Hygiene.*

Results and Conclusions.—These data, covering a total of 28,939 industrial accidents, show a ratio of approximately one accident to every one of the 27,012 new men hired. This is four times as great as the incidence of accidents among the total number on the pay-rolls examined, and in itself constitutes striking evidence that new employees are powerful factors in raising the number of accidents. There are, however, still more striking demonstrations. A glance at Figures 1 to 5 will show that the number of accidents varies somewhat from month to month; and that *the number of new employees varies likewise.* This holds true for the total figures and for those of the separate establishments.

Further confirmation of these results appears in data gathered in a manufacturing establishment (furniture) where figures

TABLE II

Showing Average Working Force, New Employees Hired, and Accidents Each Month, in 1921, for Four Different Manufacturing Establishments

Month	Company A			Company B			Company C			Company D			Total		
	Accidents	New employees	Average force	Accidents	New employees	Average force	Accidents	New employees	Average force	Accidents	New employees	Average force	Accidents	New employees	Total
Jan.	18	48	400	140	513	4,953	17	100	2,405	1,988	299	7,860	2,163	960	15,618
Feb.	86	65	370	189	526	5,415	15	95	1,887	1,954	442	8,537	2,244	1,128	16,209
March	74	70	380	227	970	6,091	12	265	2,118	2,248	797	8,578	2,561	2,102	17,167
April	31	32	365	308	1,124	6,311	20	340	2,143	2,382	922	9,132	2,741	2,418	17,951
May	75	60	360	230	1,267	6,354	21	585	2,400	2,561	1,363	9,668	2,887	3,275	18,782
June	92	104	395	336	1,426	6,499	23	1,032	2,741	2,834	1,214	9,948	3,285	3,776	19,583
July	85	60	371	303	1,253	6,482	27	524	2,722	2,869	1,063	9,927	3,284	2,900	19,502
August	36	25	380	292	1,354	6,001	25	345	2,714	2,770	1,282	9,710	3,123	3,006	18,805
Sept.	52	48	392	238	1,188	5,775	18	367	2,657	1,602	330	6,885	1,910	1,933	15,709
Oct.	24	16	425	277	1,377	6,941	22	386	2,629	1,235	331	6,613	1,558	2,110	16,608
Nov.	26	22	406	315	1,460	7,626	14	100	2,175	1,011	169	6,482	1,366	1,751	16,689
Dec.	26	18	432	313	1,288	8,120	23	143	1,888	1,455	205	6,847	1,817	1,654	17,287

were available for the two six-month periods of 1919. With an average working force of 899 during the first six months, there were 935 new men hired, and 233 accidents. With an average working force of 1015 (13 per cent. greater) during the second six months, there were 816 men hired and 193 accidents. In other words, despite the larger total working force during the second period there was a reduction in number of new men hired.

Similar conditions appear in the records of another concern for 1920 and 1921. With an average working force for the first year of 2498 and for the second, of 2417, there were nevertheless 2130 accidents for the first year and 1486 for the second; the number of new employees during these two years were 1415 and 761, respectively. Thus, from whatever angle they are examined, the figures show an extremely close relationship between the number of new employees and the number of accidents.

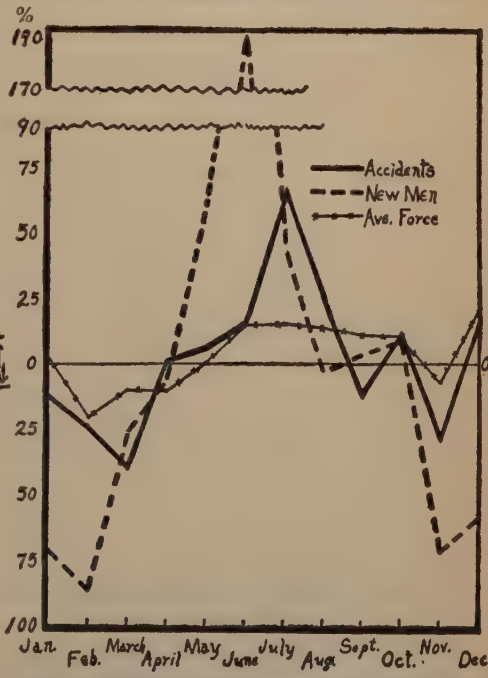

FIG. 3.—Showing (in percentages) the monthly deviations from average of new employees hired, accidents, and working force, for Company C. Courtesy of *The Journal of Industrial Hygiene*.

Special attention might well be directed toward the relation between the average monthly working force and the number of accidents, for it has been alleged that in periods of increasing industrial activity, represented by the growing size of the work-

ing force, accidents tend to increase as a result of the general condition. It is true that the fluctuations in accidents follow to a slight degree the fluctuations in average working force, but they follow with far closer correspondence the fluctuations in the number of new employees. This supports the conclusion that the influence of new employees in producing accidents is greater than the influence of mere increasing industrial activity as measured, at any rate, by total working force; and it confirms Chaney's figures, which show that the fluctuations in frequency of accidents in the iron and steel industry follow the fluctuations in frequency of new employees more closely than they follow any of his other measures of increased activity.

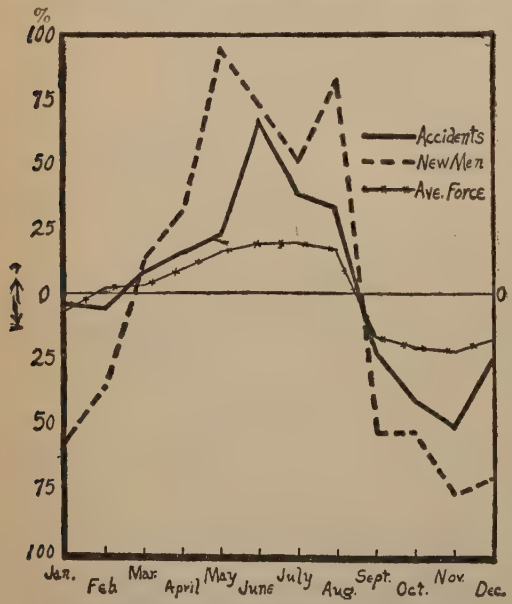

FIG. 4.—Showing (in percentages) the monthly deviations from average of new employees hired, accidents, and working force, for Company D. Courtesy of *The Journal of Industrial Hygiene.*

The reasons for this are easy to surmise. The new employee comes to his job often with insufficient training for it, and thus makes mistakes which eventuate in accidents. Or, though he may be skilled in the duties of the job, he may be unfamiliar with the routine of the plant and thus may make false moves. Again, during the early stages of his employment in a new plant he is likely to feel nervous and thus make errors.

It must, of course, be admitted that new employees are not the sole source of industrial accidents. Accidents happen to old

employees as well. If there were no new workers admitted into a plant there would undoubtedly still be accidents. The figures in Table II show that they occurred among all employees with a ratio of one accident to every four employees, whereas they occurred among the new employees with a ratio of one accident to every employee hired. The matter is graphically shown in Figures 1 to 5, where, even though in some months the number of new entrants falls very low, there are still accidents due to other factors. Of all the factors which have been thus far considered by investigators, however, none seems to show such decidedly close correlation as the subject of this present investigation.

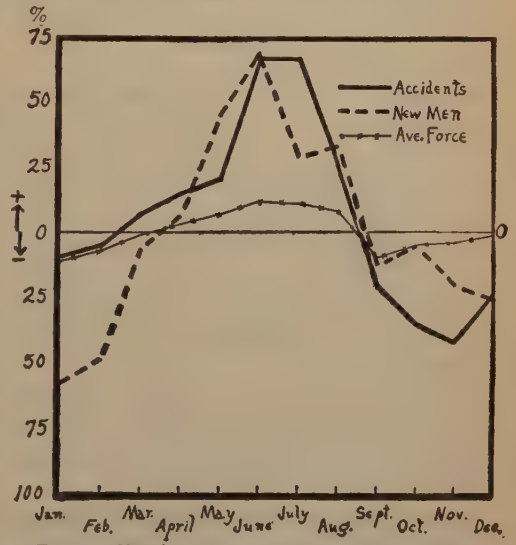

FIG. 5.—Showing (in percentages) the monthly deviations from average of new employees hired, accidents, and working force; combined data. Courtesy of *The Journal of Industrial Hygiene.*

Practical steps that suggest themselves in the light of these findings are: In order to reduce the number of accidents, reduce the turnover. If the number of new employees could be reduced to zero, the number of accidents would probably be reduced by 75 per cent.

When the costs of turnover are being computed from such items as spoiled work, damaged machinery, etc., a percentage of them should be computed from the amounts paid in settlement for accidents.

An increased amount of time spent in instructing new employees might aid materially in reducing the number of industrial accidents.

Clerical Work and Other Overhead Expenses.—Every time an employee gives up his job there are certain clerical tasks involved—taking his name off the pay-roll, cancelling his company insurance and benefit account, etc. A corresponding amount of time and work must be expended in behalf of the newcomer, interviewing, filling out blanks on personnel record cards, and filing them. Besides these clerical tasks are a number of other items that are usually classed as overhead. They all cost money and should be added to the already mounting volume of cost chargeable to turnover.

Lowered Company Morale.—The above items are chiefly material, in the sense that they represent losses that may usually be perceived with a rigid enough system of cost accounting. But there are other losses which, because they are psychological, are not so readily perceived. One is the lowered morale of a company where workers are constantly changing. *Esprit de corps* is a matter growing out of long association of one workman with another, and of long acquaintance with the proprietors. With a shifting personnel this is lacking, and though not easily estimated, it causes very real loss.

Loss to the Worker.—But the employer is not the only one who suffers from labor turnover. The worker who leaves, whether voluntarily or involuntarily, often loses greatly. His losses may be itemized as follows:

"1. Loss of earnings during unemployment before obtaining a new position.

"2. Expense and difficulty of obtaining a new job.

"3. Deficiency in earnings while learning a new job. This deficiency may be permanent. Older men especially find difficulty in obtaining work at which they can earn what they previously earned, even though their capacity may warrant continuation of their previous earnings.

"4. Greater exposure to accident while learning the new job.

"5. Cost of moving if the new job necessitates the workman's moving his family to another section of the city or to a new locality.

"6. Impairment of the development of his skill in his occupation by the interruption of employment and by the necessity of

accepting work in other lines which do not give him experience of value in his regular occupation.

"7. Demoralization from idleness or constant shifting, leading to discouragement, to loss of ambition, and often to dissipation, or to the development of the habits of floating and to an aversion to continuous employment." (18)

Loss to Society.—While considering the costs of turnover that are immediately felt by the employer and the employee, we must not forget that the public suffers also. All the inefficiencies cited above react upon the public welfare in causing waste of commodities and increase in prices.

Causes of Turnover.—In the effort to reduce the size of the turnover attention has been directed toward the discovery of its causes. Personnel departments are accustomed to inquire of every man who resigns as to the reason. They then compute the frequency with which the reasons occur in a hundred cases. This list of typical replies is taken from the records of a metal-working establishment: "More attractive opportunities, 38.9; dissatisfaction, 45.4; change of residence, 3.4; illness or ill health, 9.3; scattering, 3.1." (18)

Though such data are valuable as far as they go, they are not entirely revelatory of the true conditions. Some of the reasons given are only superficial; the real reasons may be quite different. Modern psychology is bringing to light the fact that the conduct of workers is motivated by forces that are not always evident, even to the workers themselves. Accordingly, it is quite probable that for a true understanding of the causes of labor turnover we shall be obliged to look beneath the surface and correlate the resignations with certain other circumstances surrounding the workers.

Disparity between Intellectual Level and Demands of the Job.—One factor that has been discovered to be effective is the disparity between the ability of the individual and the demands of the work. If a person has more ability than the work he is doing calls forth, he is likely to grow restive and seek other work. If he does not have enough ability for the job, he is likely to give it up unless, indeed, he is previously discharged for incompetency. Scott and Clothier have shown that such

cases do actually occur, and that such relationships do actually exist. (Quoted on page 119.) Of course, the persons who quit do not give as the reason that their ability is too great or too small for the job; they usually give one of the stock reasons cited above. The fact is, however, that this disparity constitutes one of the real though obscure psychical factors in labor turnover.

Relation between Age and Turnover.—Another one of the hidden factors in turnover is the influence of age. The tendency to leave one's job as manifested among men of various ages has been shown by an investigation carried on by the author. A study was made of the service records of 2500 workmen who left consecutively, either voluntarily or involuntarily (almost all resignations were, of course, voluntary), in four firms during 1920. Two of these groups (metal workers, 297 of whom were in firm C, and 294 in firm D) were investigated by the Scott Company. The other two groups (A, consisting of 1483 workers who left the employ of a metal-trades manufactory; and B, consisting of the first 500 men leaving the service of a furniture factory during 1920) were investigated by the writer.

The workers were classified into age groups at five-year intervals, the age recorded being that given at the time of hiring. The average number of weeks worked by the members of each age group was then calculated. (See Table III.) In case a worker

TABLE III

Showing Number of Resignations and Average Number of Weeks Served in Different Groups

Age	Number of Resignations		Average Number of Weeks	
	Co. A	Co. B	Co. A	Co. B
Under 21	271	204	18	10
21–25	341	96	19	9
26–30	296	60	23	11
31–35	231	30	31	24
36–40	155	38	28	19
41–45	84	26	29	12
46–50	72	17	30	8
51–55	17	12	58	15
Over 55	16	17	56	25
Totals	1,483	500		

had been hired, had resigned, and had been rehired, the length of service was computed for the period immediately preceding each resignation.

Results and Conclusions.—1. The curves in Figure 6 show, first of all, a relatively short period of service on the part of workers under 25 years of age. This is to be expected, in view of the natural instability of youthful interests, the entirely worthy search for vocational objective, and the absence of the anchorage of economic and social responsibilities.

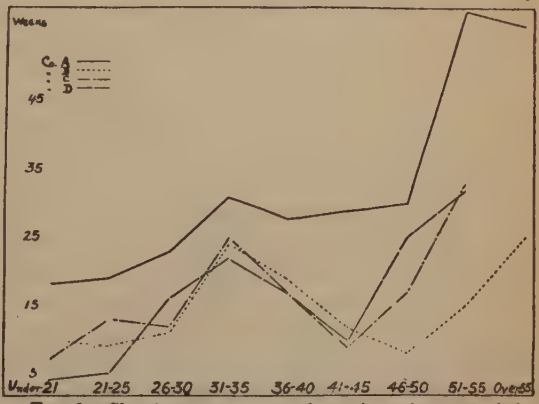

FIG. 6.—Showing average number of weeks worked by "quits" of various ages in four industrial establishments. Courtesy of *The Journal of Industrial Hygiene.*

2. The long service of workers over 50 is, of course, due to an opposite set of conditions: stability of interests, or habit, or recognition of the fact that gray hair is inimical to a favorable change of job.

3. With similar ease one can explain the long average period of service between the ages of 31 and 35, when men are rearing children and paying for a home.

4. Contrary to expectation, however, the length of service does not increase regularly with age. There comes a time when it decreases, namely, from 36 until 50 years of age, the minimum being reached between 41 and 50. In other words, this last-mentioned period appears to be a critical time when men give up their jobs with unusual frequency. This is manifest in the records of every one of these companies, although not so clearly in the case of company A as in the others. Indeed, the length of service for all ages is greater in this firm, probably because of the extraordinary measures which are taken to insure long

service. By means of home visitation the company maintains oversight over living conditions and applies remedies even to the extent of helping a workman find a better house. In 1920 it gave a bonus to all who remained more than three months. (It will be noted that even the age groups with the shortest term of service remained, on the average, four months—just long enough to receive this bonus.) That such solicitude for the physical and mental conditions of workers served to prolong the term of service in this plant appears unmistakable, especially in the case of the men at the critical age period, but it could not completely obliterate the effect of this critical age, for instead of rising regularly to the 55-year period, the curve takes the shape of a plateau.

The explanation of this critical age phenomenon gives rise to several interesting hypotheses. The first two to be offered are economic; the third is psychophysical.

1. By the time he has reached the age of 40, the laboring man has usually reared his children to a point where they can at least partially provide for themselves, and he has perhaps completed the payments on his house; consequently, he feels a degree of freedom in leaving one job to seek another.

2. Again, as he nears 40, he realizes that he is entering upon the period of declining strength and graying hair, when it will be increasingly difficult to secure a new job. And if he sees no further possibilities in his present job he feels that now is the time to make a change.

3. Apart from these economic considerations, however, there are others of a psychophysical nature. At this period there may be generating within the man certain deep-seated physiological changes. Just as woman at approximately the age of 45 undergoes the period of change known as the menopause—a period characterized by glandular and organic adjustments and psychic disturbances more or less serious in character—so the male, as he reaches the same age, probably passes through a similar period. Because the symptoms are not so highly marked in the male, the occurrence of the phenomenon is not so universally recognized even by the medical profession. Mendel (14), however, and Church (6) called attention to it about fifteen years

ago, alleging that it lasts from eighteen months to three years, and manifests itself in the following symptoms: high arterial tension, digestive and intestinal disorders, headaches, quick fatigue, oppressed feelings in the chest, sudden sensations of an alarming nature, especially vertigo. Most striking of all are the psychic accompaniments of the period: an almost invariable tendency to mental instability, sometimes leading to actual insanity, sometimes consisting merely of what Freud calls an "anxiety neurosis" (directed, perhaps, to the period of impotence which is due in ten or twenty years?).

It is interesting to note in this connection that the age at which persons coming down with senile dementia begin to come to state hospitals for mental diseases is between 40 and 49, and that patients suffering from general paralysis are admitted in greatest number between the ages of 40 and 49. (15)

We may reasonably believe, therefore, that there is a period in a man's life when he becomes especially unsettled mentally, and that this uneasiness expressed itself in the special frequency with which the men included in the investigation here reported quit their jobs.

Such a conclusion suggests that employers should exert considerable solicitude for men at this critical age; that they should be on the watch for symptoms of restlessness and irritability; that they should view these symptoms with toleration and sympathetic understanding; and that they should endeavor to take special remedial measures, such as giving increased responsibility, or more pay, or even a change of job, to those who are worthy. It suggests further that just as this critical age period affects the tendency of a man to quit his job, so may it affect him in other industrial relationships; even in other non-industrial respects, all of which should be investigated. The problem should be studied also in connection with workers in various classes of occupations.

Such investigations as these force one to accept the conclusion that the reasons for leaving a job which are most frequently given are really only superficial; that the most vital causes are probably hidden, whether intentionally or unintentionally; and that

more subtle methods of investigation are required for their detection.

Remedies for High Labor Turnover.—Granted that perhaps a good deal of labor turnover can be avoided, the next step is to apply remedies. They must be applicable to the causes discovered. Some remedies may be physical, such as better ventilation or lighting, protective devices, shorter hours. Others may be economic, such as higher or more equable wages. Some may be social, such as recreational facilities or home visitations, though with the qualifications on page 25. Others may be physiological, such as medical examinations that will reveal incipient diseases; or better still, physiological tests that will aid in the detection of persons who are constitutionally unfit for certain kinds of work. One item in such examinations may be the detection of susceptibility to diseases peculiar to the occupation. Finally, some of the remedies to be applied are psychological. No attempt to enumerate these will be made here, since the entire book is devoted to a consideration of them. The forms they may take are illustrated by the measures that were recommended on behalf of the men at the critical age discussed above. Common sense as well as the methods of science demand that thorough records be kept regarding employees, so that facts may be discovered by investigation. The form these records might take may be well characterized by the term "labor audit." On an "ability record blank" may be noted a list of all the jobs at which a worker has been engaged. Further discussion of this point is given in Chapter Eleven.

Change from One Occupation to Another.—The foregoing discussion has dealt with occupational changes as they occur within a single establishment or a single vocation. There are, however, other changes, those made by an individual in going from one vocation to another. To answer the question, How frequently do people change from one vocation to another, access should be had to the biographical histories of a number of individuals. These are hard to find. Lacking other source, the writer went to *Who's Who in America* (1919–1920) and studied intensively the biographies of the first 1000 persons listed.

Notation was made in each case of present vocation (the classification appearing immediately after the name); of change in vocation; of age at time of change; and of amount of advanced educational training. A person was considered to have changed his vocation only when he went clearly out of one field into another. Results are shown in Tables IV to VI.

Number of Individuals who Changed Vocations.—Of the 1000 eminent persons investigated, who were chosen according to the arrangement of the alphabet and who may therefore be regarded as a fair sampling of the 25,000 eminent persons in America, 164, or 16 per cent., recorded changes in vocation. Others may have changed, but through oversight or intention, they failed to note the fact.

TABLE IV

Number who changed vocations

Number	Per cent.	Number of times changed
104	63	1
28	17	2
23	14	3
6	5	4
2	1	5
1		6
Total 164	100	

TABLE V

Ages at which changes were made

Age	Number	Per cent.
Below 15	7	3
15–24	71	28
25–34	89	35
35–44	54	22
45–54	20	8
55–64	9	3
Over 64	2	1
	252	100

No dates given: 17

Total 269

TABLE VI

Number in each vocational group who changed vocations, and the number in each vocational group who lacked collegiate training

Vocation	Total No.	Per cent.	No. who changed	Per cent. who changed	No. without college tr.	Per cent.
Politician	57	5.7	44	77	15	26
Writer	145	14.5	29	20	25	17
Lawyer	114	11.4	13	11	0	0
Engineer	41	4.1	4	10	3	7
Educator	173	17.3	16	9	0	0
Clergyman	78	7.8	7	9	1	1
Scientist	56	5.6	2	4	0	0
Physician	68	6.8	2	3	0	0
Army and Navy	41	4.1	1	2	5	12
Artist	55	5.5	0	0	0	0
Miscellaneous	172	17.2	46	26	50	29
Total	1000	100.0	164		99	

Though this number does not appear astonishingly large, it still indicates an appreciable number of successful persons who, during the course of their vocational development, change vocations at least once. And if so large a number of these successfully adjusted persons change, it is more than probable that, among the larger mass of workers not listed in *Who's Who*, the number who change their vocations is much larger. Indeed, it is a matter of common knowledge that there are vast numbers of the unsuccessful and the less successful who drift from one field to another; from errand boy to street-car conductor, thence to mail-carrier, then to truck-driver, etc.

The changes made by these unbiographed workers are not at present accessible to study, but they may be inferred from the many evidences existing in the labor field. The fact that industrial concerns commonly report yearly turnovers amounting to more than 100 per cent. is eloquent evidence concerning conditions. Of course, not all cases of labor turnover represent changes from one vocational field to another; nevertheless, it is quite certain that a considerable number do.

Average Number of Changes.—These eminent persons have not been obliged to make very many changes before reaching

their present vocations. More than half of the 164 who changed —63 per cent., in fact—are recorded as having changed only once; and the entire 164 only 259 times, on an average less than twice. (It is of course possible that some failed to report certain changes.)

Age at Time of Change.—One-third of the changes were made before the age of 25, and two-thirds before the age of 35. This indicates that most of these successful persons had settled upon a satisfactory vocation before the approach of middle age. Still the fact that one-third of the changes were made after 35 (see Table V) means that changes in middle life are quite usual. The frequency of change at this period confirms the results of the investigation reported on page 44, in which it was discovered that the period beginning with 35 is a critical age among laboring men, when they tend to change their jobs with especial frequency. These figures seem to indicate that among these eminent persons, also, there is a considerable amount of restlessness at this critical age.

Change as Related to Education.—The figures show conclusively that those persons with a considerable degree of education made the fewest vocational changes. Ninety per cent. of the 1000 cases examined had received training of collegiate grade. Even more light comes from a study of the amount of education possessed by those in the various vocational groups. The vocation of politician, containing 77 per cent. of those who changed, contains the largest number of persons without higher education —26 per cent.; that of writer, containing the second largest number who changed, shows the second largest proportion of "uneducated;" and those vocations showing fewest changes show the smallest proportion of persons without advanced education. From which the conclusion may be drawn: the higher the degree of education, the less the chance of vocational change.

In explanation of this it may be proposed that it was their high degree of education that made the stable persons remain in one vocation; that, having been trained in one line, and knowing nothing else, they were obliged to remain in it whether they were successfully adjusted or not. Such an explanation is, however, hardly justified, for the very fact that these persons are listed in

Who's Who argues that they were successfully adjusted. Surely appearance in *Who's Who* can be considered as a mark of vocational success. It is therefore almost certain that those who remained stable in one vocation had no cause for leaving it because of lack of success. The probability is that the education simply helped them to become rather speedily stabilized. It is of interest to note that Brissenden and Frankel found that separations occurred among unskilled workers at a rate (per full-year worker) of 1.41, whereas they occurred among skilled workers at a rate of only .66. (3)

Conclusions and Summary.—This study of vocational histories does not attempt to state how many vocational changes ought to occur. It only reveals the number that actually do occur. If our figure of 16 in 100 errs, it is too small rather than too large. For it may not include all the changes made by the persons studied, and it most certainly does not represent the considerably larger group of admittedly less stable workers.

Furthermore, this study gives no information regarding the causes of the changes. Some of them may have been due to lack of successful adjustment, but others were probably natural steps in the development of the individual and of society, as, for example, the changes made by a professor of mathematics who accepted a post as government statistician and thence went into politics. To distinguish these normal changes of the successful and growing individual from those of the poorly adjusted one, and to determine what per cent. are avoidable and not avoidable, is the next problem that should be investigated.

When we have established the fact that certain shifts of vocation are necessary to successful growth in a changing world, then we shall abandon the futile search for a fatalistically predetermined vocation for each individual. We shall regard vocational life as a process of evolution, in which successful adjustment in one line of work may be but the preparation for another more exacting occupation. In other words, we shall look upon each job as merely a stepping-stone to another.

Granted that unnecessary and wasteful changes should be avoided, this investigation clearly indicates one way to avoid them—give education. For it was in those vocations containing

the largest number of the uneducated, that the greatest number of changes occurred, and it was found that among those with the highest degree of education, comparatively few changes occurred.

These figures also indicate that a high degree of education will have another salutary effect—that of throwing certain changes that are bound to occur, farther back in the years of immaturity. And since in the very process of seeking intensive vocational training, a person can make some trial of a vocation, and can determine his reaction toward or away from it before the training is completed, to complete this period of trial at a relatively early age, before deep economic and social and habitual roots are established, is surely a desirable end to work for.

Finally, the results of this investigation point to the necessity of having as material for investigation the vocational histories of a number of people, particularly of the large mass of workers in trade and industry. One of the first objectives of vocational guidance bureaus should be to build up records of the employment histories of those placed in occupations. Records should be kept of the changes they make from one occupation to another, and of the degree of success and failure in each one. Accompanying these records might also go the results of certain periodic examinations by means of psychological-physiological and trade tests. Such data recorded for a large number of persons, over a long period of time, would permit the approximate determination of the number of vocational changes that were beneficial, and the number that were undesirable, the number that might be expected to occur normally, and the number that should be eliminated by more rigid methods of guidance. Besides these questions there are a large number of others which might be solved from such records—questions of the greatest moment in the scientific establishment of vocational guidance.

Some Changes Are Beneficial.—While it is readily acknowledged that many vocational changes are wasteful to the employer and to society, and demoralizing to the worker, the more encouraging fact should be noted that a certain number of them are normal and really beneficial. They may take place in the case of a person who is perfectly adjusted to his job. Since taking it he may have developed such high abilities that he has

made himself fit for some other position, one perhaps beyond the power of his present employer to give him. It is such reflections as this that lighten the survey of the truly disheartening array of changes among the vocationally maladjusted.

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CHAPTER IV

VOCATIONAL ANALYSIS

Analysis of the Vocation as Related to Analysis of the Individual.—Vocational adjustment, in its broad sense, is usually said to involve the analysis of the vocation and the analysis of the individual. These are usually regarded as two separate undertakings which can be considered apart from each other. When this conception is critically examined it is seen to be faulty. From the psychological point of view a vocation has no existence apart from the worker in it; psychologically it is nothing but the worker at work. Note should be made of the fact, too, that a vocation should not be considered as static. It is an active thing, an on-going process. The psychological analysis then will reveal not stationary abstract qualities but active concrete operations.

It is true that in some of our discussions we may seem to divorce the vocation and the individual, in that we focus attention now on one and now on the other. We may justify this treatment on expository grounds, but we insist that in the actual work of vocational adjusting the two must be considered together. Perhaps it is possible, when considering the vocation from the physical and economic points of view, to speak in terms other than those of the worker's activity, but whenever the "human factors" are to be considered, as they are in this book, the vocation ceases to be a static entity; it becomes instead a *human activity* bearing some relation, it is true, to the physical components of the vocation, but being still a form of human conduct in which the worker circulates about in his work. Defining vocational analysis as a process of dissecting a vocation and describing its component elements, we shall maintain the aim of describing it in terms of the human conduct involved.

Vocational Analysis May Serve Several Ends.—It is regarded by vocational counsellors as a prerequisite to intelligent vocational guidance, for only after knowing the components of a vocation can one advise an individual regarding his probable fit-

ness for it. Personnel managers in business establishments also use the technique of analysis in preparing the job specifications through which they employ their workers. A newer use, which has come into recognition since the war-time burst of enthusiasm for personnel work, is connected with the grading and routing of jobs for the sake of rating and promoting workers. Analysis is an indispensable prelude to the construction of a trade test, for only by charting the components of a job can a test be prepared that measures proficiency. On the side of production in industry, also, analysis is regarded as of paramount importance. Through it may come the discovery of wasteful operations; some of which are connected with machinery; others with the worker. In the case of the latter, fatigue, and often exposure to dangerous accidents, may be prevented or minimized. Analysis is also useful in the setting up of standards of performance—the standard day's task—and the establishment of equitable wage scales. It may be used in the accurate computation of costs and the estimation of new contracts. In short, all the ends which have been served by time and motion study in industrial management may be served by analysis. Finally it may be made from the standpoint of the teacher of vocational subjects who desires to discover what are the components of the various vocations, so that he can build a curriculum. (11)

As colored by these various ends the attempts at analysis have gone under several names—vocational analysis, occupational analysis, job analysis. The first refers to analysis of a profession or a trade; the second to analysis of a specialized occupation within a profession or a trade; and the third to analysis of a particular operation within an occupation. The distinctions may be illustrated by calling the profession of physician a vocation; that of eye specialist (oculist) an occupation; and that of dilating the pupil of the eye a job. Again, the machinist's trade is a vocation; lathe operating an occupation; cutting a three-eighths-inch shaft a job.

The distinctions between these kinds of analysis have not been carefully observed. Neither have distinctions been clearly made between the different ends of analysis. From one point of view it is held that there is no difference in the ends for which

the analysis is made. Analysis is analysis, and the same procedure must be followed regardless of the end to which the results are to be applied. As it is generally practised, analysis is employed for but one purpose at a time, and the best results are probably secured, at least at this embryonic stage of analysis, if the exact purpose of the analysis is kept in mind while it is being made, though, as will be shown presently, results secured from analysis made for one purpose may often be applied to other ends.

Complete Analysis Requires Several Points of View.—In order that theoretical completeness should be achieved the vocation should be analyzed from several points of view.

Physical.—Certain elements of the work can best be expressed in physical terms: the length of the working day, the number of pounds that must be lifted throughout the day, etc. The engineering studies that are made in various occupations (sometimes called time and motion studies) for the purpose of discovering ways by which the work may be made more efficient belong in this category.

Physiological.—Certain elements of the work may be most conveniently described in physiological terms: the visual acuity required in navigation, immunity to certain occupational diseases such as lead poisoning.

Economic.—To know what amount can be earned in a vocation is a necessary end of job analysis, and each analysis should contain frequency tables showing the number of employees who receive wages at the different levels. Tables should be prepared like the following (Table VII), showing the commissions earned in one year by 100 salesmen of a nationally known commodity. From such data prospective recruits to a vocation may know in advance what are the economic opportunities in a vocation.

Social.—Of importance in some vocations is the nature of the human associations involved: whether the worker will have to deal with the public; how intimately he will have to associate with his co-workers; the social status of the latter.

Psychological.—Finally come the psychological factors involved in the vocation. By these are meant the degree of intelligence required, the habits that must be acquired, the emotional strains to be endured, etc.

TABLE VII

Commissions Earned by 100 Salesmen

Percentile Rank	Amount	Percentile Rank	Amount
100	$20,429.97	50	4,313.41
99	13,749.17	49	4,312.26
98	11,271.52	48	4,229.72
97	11,138.72	47	4,183.87
96	9,553.81	46	4,178.66
95	9,037.24	45	4,110.58
94	8,723.63	44	4,027.05
93	8,065.13	43	4,002.01
92	7,967.83	42	3,978.57
91	7,909.62	41	3,900.46
90	7,580.33	40	3,892.85
89	7,352.37	39	3,877.50
88	7,333.56	38	3,850.90
87	7,121.72	37	3,796.26
86	6,602.50	36	3,744.33
85	6,501.17	35	3,742.19
84	6,166.30	34	3,706.92
83	6,104.54	33	3,679.19
82	5,884.05	32	3,658.40
81	5,874.72	31	3,642.08
80	5,770.85	30	3,607.69
79	5,641.39	29	3,472.52
78	5,598.87	28	3,419.39
77	5,575.44	27	3,412.31
76	5,497.49	26	3,386.67
75	5,430.16	25	3,373.96
74	5,419.30	24	3,342.12
73	5,295.09	23	3,317.41
72	5,138.17	22	3,314.92
71	5,096.32	21	3,290.88
70	4,927.49	20	3,252.79
69	4,922.72	19	3,201.05
68	4,913.19	18	3,189.21
67	4,893.18	17	3,129.99
66	4,849.59	16	3,129.15
65	4,839.06	15	2,978.19
64	4,753.43	14	2,964.33
63	4,737.59	13	2,893.74
62	4,691.90	12	2,846.78
61	4,647.90	11	2,841.76
60	4,625.05	10	2,804.89
59	4,607.53	9	2,729.02
58	4,523.92	8	2,709.87
57	4,488.67	7	2,653.84
56	4,465.84	6	2,621.85
55	4,451.50	5	2.595.09
54	4,448.07	4	2,590.21
53	4,379.86	3	2,566.59
52	4,362.02	2	2,556.40
51	4,325.39	1	2,536.58

It should be understood that in actual analysis the several points of view mentioned in the above paragraphs do not necessarily have to be kept separate from each other. They may be combined in one act of analysis, in the attempt to make an all-around picture of the vocation. A separation of the points of view will be maintained in this book, however, and while recognizing the necessity for analysis from all points of view, we shall concentrate our attention upon psychological analysis. We might remark parenthetically that many of the recommendations we shall make regarding the application of the science of psychology to this problem refer with equal strength to the employment of the sciences of physiology, economics, and sociology.

Classification of Vocations.—It has been suggested that the first step to take in analyzing vocations is to classify them. Several bases for classification have been suggested. One is that of Petitpierre, who classes them first into three large groups: intellectual occupations, manual occupations, and occupations where a balance of these two kinds of capacity is necessary. Each of these large classes then is divided into smaller groups. "Let us take, for example, the manual. It is often said: 'This boy has mechanical ability and therefore ought to be a mechanic.' Such a judgment neglects entirely the fact that there are innumerable varieties of mechanical work. A man who day after day works with minute instruments of precision surely must have a different mentality from that of one who spends his time constructing locomotives or large machines. It is then an error to place all mechanics in the same group.

"But the mechanic who works with minute parts has some predominating qualities analogous to those possessed by certain other workers in fine parts, such as the cabinet-maker and the garment-cutter, just as the mechanic who works on locomotives has certain qualities which are common also to the carpenter and the stone-cutter. This demands that we group the manual trades not according to the materials worked on but according to the parts of the human body which are chiefly called into play.

"The mechanic who must make fine movements, the cabinet-maker, and the garment-cutter, must all work chiefly with their fingers. The mechanic who works with large objects. the car-

penter, and the stone-cutter, work chiefly with their hands. The blacksmith and the butcher work chiefly with their arms.

"The trades belonging to the first group require other common qualities: tranquility while at work, precision, love of detail. They also involve similar working conditions, such as sheltered indoor workrooms. The persons engaged in the trades of the second group must be more robust; their work requires less concentration and more movement; and they work in large workrooms or in yards. The workers of the third group usually work outdoors, where they are exposed to marked changes of temperature. They must therefore be capable of withstanding various inclemencies. Again for them the degree of precision expressed in hundreds of millimeters does not exist.". . .

"The effort of psychologists who are engaging in vocational guidance must then be: (1) To determine large groupings of occupations according to the parts of the body from which they call forth the greatest activity. (2) To find tests which will characterize each one of these large groups. To attempt to dig out the minutest details of each occupation would be too complicated and exhausting. Only large groupings can be of practical utility for vocational counsellors, since every person is so constituted as to be capable within certain limits of equally good achievements in several directions." (13)

Intelligence as a Basis.—Another basis for classification that has been proposed is intelligence; according to which the vocations are to be grouped according as they require the same degree of intelligence. A start toward such grouping was made during the war. Soldiers drawn from civilian life were measured with intelligence tests, and were then grouped according to their vocations. The average intelligence score made by the members of each vocational group was then computed. Thus the average score for blacksmiths was about 50, and that for civil engineers was 120. There were many overlappings. For example, there were some blacksmiths who had as much intelligence as some engineers. This is to be expected, partly because no work of classification can be complete, partly because in every vocation there are people of varying degrees of success, since they possess different amounts of the traits necessary for success in the vocation;

partly because, though possessing intelligence in different degrees, they exercise other traits in order to compensate.

Because the possibility of grouping vocations according to the amount of intelligence required appears so easy, it has had a wide appeal. It seems like a feasible aim to seek to establish a level for each vocation and to say, "Mining engineers on the average stand in the eighty-third step of an intelligence scale from zero to 100; therefore one who wishes to become a mining engineer must score 83 on the intelligence test." Before jumping to such a conclusion, however, one must take several things into consideration. First is the fact that there are many mining engineers, perhaps 50 per cent., who stand below 83. They may be 15 points below. Accordingly, one who stands that far below may conceivably still be a mining engineer. The answer is, yes, but he probably will not be a good enough engineer to warrant his making the attempt. This raises the question, how good must one be in order to be justified in making the attempt? No one has yet determined this, but it should be determined. In other words, some "threshold" should be established, perhaps at the 30 per cent. point of distribution of all employed, perhaps at the 25 per cent. point.

Even if such a classification of vocations were made, there still would not be very positive indication as to what particular vocation a person should enter, because the possibilities at any one level of intelligence would be so numerous. A person at the level of 15 units might have enough intelligence to be a street-sweeper, a car-marker, or any one of 300 other vocations. One at 25 might have enough intelligence to enable him to succeed at these 300 plus 500 more. At 60, 80, 90, one might have an increasingly wide scope. At best such a classification takes account of only one component of vocational adjustment—intelligence.

Probably the greatest service to expect from this type of classification is to be able to tell a person: "According to the tests, the chances that you possess enough intelligence to perform the work of this vocation as well as the 'average' person in it are 100 in 100, or 50 in 100, or 25 in 100, etc." If the chances seemed too low, perhaps less than 50, and the person had no other

conditions that would give him an advantage sufficient to compensate for his deficient intelligence, he might perhaps profitably turn aside from the occupation. This method of using intelligence levels will be discussed more fully in a later chapter.

Other bases of classification are possible. Gilbreth suggests that they be classified according to particular faculties demanded, "listing under one head all those requiring keen eyesight, under another head all those requiring keen hearing, and under a third all those where a fine sense of touch is essential, etc.;" also "by classifying all occupations according to the amount of endurance or strength required." (7)

Another classification (anatomical), by Amar, is as follows:

"(1) Operations in which the weight of the human body is alone employed.

"(2) Operations in which the muscles of the arms are used.

"(3) Operations employing the muscles of the legs.

"(4) Miscellaneous operations.

"In analyzing work the object should not be to subdivide the processes involved into the most elementary functions. The more elementary the psychological functions used in this analysis, the less characteristic will be the manner in which they are combined in the operation under consideration. If the functions selected are more complex they will give a more exact representation of the processes which they illustrate. The subject of work may be either persons, things, or ideas. Does the work merely involve an effort of comprehension, or is it creative or symbolic in character? Are the methods of doing the work narrowly defined or comparatively unrestricted? Is the purpose of the work absolutely fixed or is it merely laid down within more or less definite limits? In the case of physical work does it require delicate or coarse muscular stimuli? Does it consist of several processes of unequal duration? Are its component processes similar or dissimilar? Does each process deal with a large or small number of objects? Is rapidity or precision more important? Can the work be reduced to mechanical movements, or does it require incessant attention on the part of the worker? Does it require the workers to work in groups? Is it better for

the worker to be alone or in company? Is the work done in the open air or within a building, in a factory or at home?

"The analysis of operations involved in industrial work on the lines suggested above does not follow the ordinary divisions of elementary psychology, such as sensations, perception, emotions, and will. It appears to me, however, to be of great significance in considering vocational abilities." (1)

Analysis by Tests.—Many attempts to analyze vocations are based on the theory that one may analyze a vocation in terms of tests. The psychologist gazes at the occupation for a while, questions some of the workers, perhaps even performs the work more or less haltingly himself; and then concludes, "This occupation requires concentration of attention, verbal memory, reasoning about new situations, etc. Here are psychological tests, A. B, and C, which measure these several mental processes (*sic*). I will administer these tests to workers in the vocation and choose those tests wherein scores show the highest correlation with standings in vocational success." In the eyes of the analyst the "tested" abilities *constitute* the activities of the occupation. Of such sort are Münsterberg's tests for telephone operators and street-car motormen, and the most of the other tests that have been recommended for detecting vocational ability. Indeed, this theory has been applied in such wholesale fashion that in the popular mind the use of psychology in the field of vocational analysis is usually pictured as merely the application of tests.

Upon second thought the fallacy of this conception is grossly apparent. It really delineates the vocation only in terms of extraneous tests, and not in terms of the vocation itself. True, its devotees assert that by the method of correlation they find that a good performance in some of the tests is associated with good performance in the vocation, and that therefore the activity of those tests is identical with, or contains elements identical with, the activity required in the vocation. Such a conclusion is hardly warranted on the basis of the data at hand. The most frequent statistical errors committed are the reliance on too small a number of workers who have been tested by the tests; the designation of a coefficient of correlation as "high" when it is perhaps + .60. If the probable error is figured at all it is

usually very large. But chiefly there is the criticism that whatever theoretical statistics may say, the doing of the work called for by the test is not the doing of the vocational task. To sort cards in a psychological test, for example, is not sorting letters into a file, and consequently cannot be called an analysis of the vocation of file clerk.

Analysis into Abstract Traits.—Another practice much in vogue is to make a list of psychical traits supposedly required in a vocation: industriousness, affability, neatness, patience, assertiveness, and call them the analyzed components of the vocation. The chief objection to the listing of such traits is that they are abstract and general, characterizing a number of vocations, and yet no one in particular. To say that typewriting requires accuracy is no analysis, for most office occupations require accuracy. It might be suggested here that if any such general abstract trait is to be used as a component of a vocation it should be expressed in concrete terms; as, for example, in typing, an accuracy is required of no more than three errors in every 1000 strokes.

A good example of an attempt to avoid this error of abstract generalness is furnished by an insurance company which desired to analyze the psychical characteristics manifested by its best salesman. Having discovered by trial the futility of such methods as those just mentioned, the company attempts to formulate the desired traits in terms of what the best salesman does in selling insurance. Thus, instead of scheduling a mythical, abstract, general trait like "dominatingness" the analyst asks for a rating in this manner. "Does he (the best salesman) dominate the interview most of the time . . . . ; half of the time . . . .; almost none of the time . . . . ?" This method is not perfect; it involves a danger to be mentioned presently; it is only tentative, but it has the virtue of avoiding general terms that mean nothing, and it shows a praiseworthy attempt to analyze the occupation in terms of itself. Ringo, in analyzing the work of a department-store buyer, also embodied this concrete objective method by asking buyers: "Before going to market what preparation do you make? What points do you read about in

order to keep posted on various conditions in the economic world ?" etc. (14)

Analysis through Opinions.—A third questionable practice among the current attempts at vocational analysis is that of seeking the components of a vocation in the opinions of expert workers. One of the most thoroughgoing applications of this technique is that of Martha Ulrich, who has devised a schema consisting of a number of traits, which she presents to professional men—doctors, lawyers, etc.—with the request that they rate each trait according to the degree to which they think it essential in their occupation. Thus:

1 desirable	—1 undesirable
2 very important	—2 disadvantageous
3 absolutely indispensable	—3 very disadvantageous
0 unimportant	

More than 100 traits are scheduled, of the sort condemned above, such as: visual, auditory, or motor type of imagery; ability to make new associations easily; ability to think in abstract terms; a strongly developed emotional life, etc. The judgments of all are then summed up to give a numerical weight to each trait as a component of each vocation. A similar plan has been pursued by Viteles. (20) This technique in its various guises constitutes a most precarious tool of vocational analysis, for at best it represents only what some one thinks about the components of the vocation. It has no basis in fact as scientifically demonstrated, and it should be considered as only a second or third best alternative to finding out by experiment what is really required in a vocation.

The Rise of Job Analysis.—Since the war a new term has come to be applied to this process of analysis, namely, job analysis. When the men who were allotting the soldiers to jobs in our highly diversified army were requested to send a consignment of occupational specialists to France they felt the need of information about each occupation; especially about such unfamiliar trades as bakery machinist, turbine blader, pulverizer operator, rifler. Realizing that before they could select men

for these trades they must know what the occupations involved, the personnel workers in the army started to analyze the occupations in the army. They called this Job Analysis. They made useful analyses of a number of trades, and worked out a technique which has proven to be applicable in civilian as well as in army occupations.

The Method of Job Analysis.—As usually employed, job analysis is a process of describing the job from rough observation, observation to be made by the employment manager, in consultation with the foreman, and an expert worker. The job is then split up, as well as it can be with the naked eye, into a series of "unit operations." These are embodied in a statement called the job specification. The following is a typical job specification issued by the United States Bureau of Labor Statistics, describing the occupation of weaver:

"Description: The weaver watches the cloth carefully as it is woven, and changes the filling in the shuttles as it runs out, also pieces up threads that break in the warp. In some cases a weaver must oil and clean his own loom. On machines other than the automatic the chief duty is putting fresh bobbins into the empty shuttles and starting the shuttles in the machine. The work is light, but requires the worker to be on his feet most of the time. Close attention is necessary. Both men and women are employed.

"Qualifications: Must be able to stand most of the time. The weaver must be able to tell when cloth is not being woven properly, and how to 'pick out' imperfections." (12)

This description, we must admit, gives the vocational counsellor some aid; but it is deficient. It often rambles, it is general, it lacks definiteness, and, among the descriptions of several jobs about which one wishes similar data, there is no uniformity. Recognizing this, certain later workers in job analysis have prepared standard outlines or forms for making specifications of jobs. Two illustrations are given below. [For further answer to the question, What items should the job specification include? see Benge. (2)]

A. The Job Itself.
- i. General description.
- ii. Machinery.
- iii. Tools and equipment.
- iv. Materials.
- v. Motions.
- vi. Times.
- vii. Records.
- viii. Pay.
- ix. Standards of output.
- x. Amounts of output.

B. The job in relation to the organization.
- i. Physical working conditions.
- ii. Labor turnover.
- iii. The effects of the job on the worker.
- iv. Sources of labor supply.
- v. Methods of selection.
- vi. Training.
- vii. Form and efficiency of management.
- viii. Payment plans.
- ix. Living plans.

C. Sequence of operations.

D. Qualifications necessary in the new worker.
- i. Physical.
- ii. Mental.
- iii. Character.

SAMPLE JOB SPECIFICATION

Milling Machine, Hand 4. B

General Machine Shop

Prefer man from 20 to 30 years old. Good eyesight.

Work is done while standing, although stool is furnished for sitting when machine is on long run.

Pays piece rate based on 90 cents an hour.

Nine hours with no overtime.

Good man can advance to tool-room milling.

Should be able to use micrometer, combination square, scale, bevel protractor, height gauge, depth gauge.

Should be able to do:

Plain milling	Horizontal milling
Vertical milling	Taper milling
Cam milling	Spiral fluting
Slotting	Sawing
Drilling	Boring
Reaming	Straight fluting
Stagger fluting	Indexing
Graduating	Hobbing
Rack cutting	

All details of work will be shown on shop blue prints.

Common school is adequate, although special technical training is preferred. (21)

Analyses such as these are of real aid as a start; they provide for uniform descriptions of jobs and for more minute information. Perhaps they give as much detail as is necessary for vocational selection and counselling in some of the rougher unskilled occupations. But for use in highly skilled occupations and for the kind of scientific analysis that will be required in the future, they are still too rough. When we begin, as we should in certain occupations, like watch-making, for example, to take such delicate measures as those of visual acuity, we shall find such rough procedure insufficient. Perhaps we might generalize and say that whenever it is necessary to analyze the *individual* minutely it is also necessary to analyze the *job* minutely.

Four Principles of Scientific Analysis.—Casting aside the rôle of critic (sympathetic, be it understood), we shall now outline a constructive program showing in positive terms how psychological analysis may proceed to make itself effective. In a word, the advice may be given, make it conform strictly to the requirements of scientific method as stated in Chapter One. More specifically, there may be laid down four principles to which it should conform:

Analyze in Terms of the Occupation Itself.—As was pointed out in the above paragraph, the psychological methods usually employed attempt to describe the occupation in extraneous terms: tests, opinions, general hypothetical traits. The correct procedure would be to use terms describing exactly what the worker does in the occupation. The description of tasks performed by a secretary, prepared by Charters and Whitley conforms to this principle. (5)

The objection may be made to this demand for analysis of the occupation in terms of itself (particularly by those interested in vocational analysis for the sake of vocational guidance) that one cannot tell whether a candidate for an occupation possesses the capacities necessary for success in the occupation; for of course, if the occupation is described only in terms of its own operations, there are many of these operations which the candidate has not had time or opportunity to acquire, and so the analysis would not be helpful in selecting him or in guiding him.

The answer is that analysis should be made for a variety of

purposes, as has been shown, and even though the statement of operations or contents will not be applicable to the untried novice, still it will be useful in the other ways to be cited.

In Terms of the Worker at Work.—It goes without saying that the psychical components should be presented in terms of human beings. We may go further and assert that they should be presented in terms of human beings *at work*. They must not be expressed in terms of abstract general mental traits, the very existence of which is questionable, and the relation of which to the occupation under consideration is problematic. They must rather be stated in terms of the veritable operations that the worker performs in the occupation.

In Terms of Quantity as Well as Quality.—The current attempts at analysis embody mostly qualitative descriptions of the occupations. If they are to be truly useful in all the ways to be mentioned presently, they must be further refined by the use of quantitative terms. For example, in describing the occupation of proof-reading, one should, among other things, measure the output of a standard group of workers and, upon this basis, state the median requirement to be a speed of 900 lines per hour (of a certain kind of material) with no more than one error overlooked every 35 lines. Or, to change the illustration, one might state the speed required in linotyping at the upper 10 percentile to be 1000 lines per hour (with no more than one error in every 38 lines). Or one might describe the quantity of typing to be done by a typist of Grade A, as an output of 100 letters per day; Grade B, 80; and Grade C, 60.

Make Minute Measurements.—Following naturally upon the aim to analyze quantitatively, as recommended in the preceding paragraph, is the requirement that the measurements should be made minutely. It may be that the unmeasured statements or the roughly measured statements now made are sufficient for selecting workers for certain gross unskilled occupations. For the selecting of workers in more refined tasks, however, especially where tests are used which measure the reaction time of the worker in terms of a fraction of a minute or second, surely the object to which he is asked to react should be described with equal minuteness. Minute measurements are needed also in searching

for wasteful and fatiguing motions; as when Taylor found that to analyze such a gross job as shovelling required measures involving ounces; and Gilbreth found that to analyze the folding of handkerchiefs required chronocyclegraphs showing movements lasting but a fraction of a second. Again, in order to discover what factors are involved in learning telegraphy and in order to establish norms, Bryan and Harter sought measures so minute as to require electrical connections which would record every stroke of the telegrapher's fingers. (4)

Measurement of Eye-movements of Proof-readers.—A more recent attempt made by the author in the field of proof-reading illustrates the method. The particular aim of the investigation was to secure a standard of eye-movement. The established technique for the measurement of eye-movements was employed. As is well known, reading proceeds by means of a number of eye-jumps and pauses on significant portions of words. The extent of these jumps and the length of the pauses may be measured by means of a moving photographic film upon which is photographed a ray of violet light reflected into and out of the reader's eye. The light is interrupted every fiftieth of a second by a tuning-fork vibrating at that rate. The eye movements are recorded on the film as a series of small dots, each representing one-fiftieth of a second. Table VIII shows the average number of pauses, and the average length of pauses in fiftieths of a second, made by good and poor proof-readers while reading five lines of matter.

TABLE VIII

	Average Number of Pauses for Line	M. V.	Average Length of Pauses	M.V.
Good	7.4	.48	17.1	1.66
Poor	11.0	2.00	19.3	3.64

From these results we draw the following conclusions: (1) a good proof-reader makes on the average fewer pauses than a poor one—7 *vs.* 11. (2) A good reader makes on the average shorter pauses than a poor one—17 *vs.* 19. (3) A still more important matter is the demonstration of differences in regularity. The good proof-reader reads very regularly. His eye-movements are

so regular as to be almost rhythmic, with respect to both length of line and number of pauses. The poor proof-reader, however, reads irregularly. These differences may be quantitatively stated in terms of the mean variations. The small mean variations in the record of the good reader indicate that he paused practically the same number of times in each line—on the average no more than eight (7.4 plus .48) times, and no less than seven (7.4 minus .48) times. The poor reader, however, paused in one line as many as thirteen (11.0 plus 2.0) times and in another line only nine (11.0 minus 2.0) times. In length, the pauses varied between 18.8 and 15.4 in the case of the former, and between 22.9 and 15.7 in the case of the latter.

The above should not be regarded as a complete analysis of proof-reading. Such an analysis would involve the measurements of the physical demands and conditions of the job; the economic characteristics, such as rates of pay to be expected at the end of six months, one year, five years, twenty years; the promotions to be expected; the hygienic effects, such as eye-strain, longevity, etc.; and finally, a far more detailed psychological analysis, involving the determination of the degree of intelligence required; the emotional requirements and effects; kinds of imagery, and the like. These data are cited merely for the purpose of illustrating first, the kinds of measurement we should make from the psychological point of view, and second, the technique we should employ. Such are the four principles that should be followed in the application of psychology to the problem of vocational analysis. This rigid régime is admittedly arduous. It requires that the psychologist who would engage in vocational analysis must leave the shelter of his academic laboratory and enter the workshop. He need not necessarily don a mechanic's cap or a mason's apron, but he must seek his data in the activities of the worker at work. He need not necessarily invent a battery of new instruments for the measurement of these work-activities. He may secure many of the necessary measures from the records of well-organized industrial and commercial establishments. There are vast quantities of such measures available to one who will gain the confidence of live business executives and show them by results that personnel psychologiz-

ing as described above will benefit not only personnel work in general, but also their own establishments in particular.

Emphasize Analysis Rather Than Tests.—It may be objected that this program of minutely measuring occupations in terms of themselves is going to take a long time, and that the work of vocational guidance cannot wait, hence must proceed with the dubious makeshifts (particularly tests) described above. The answer is that to search for truth always takes time, but is more economical in the long run; or that tests are not leading to speedy victory, and judging from the length of the plateau they are now on, they cannot progress much further in their present form. Hence, the most economical thing to do is to lessen the emphasis upon tests, at least temporarily, and place more emphasis upon the scientific analysis of vocations until it has reached a stage of refinement equal to that of the tests. Then, perhaps, the way will be clear to improve the tests.

Again the objection may be raised that even after a vocation has been pretty well analyzed in terms of itself, the way will not be open for testing the ability of a novice aspiring to the vocation, for of course one could not be expected to perform the skilled operations required in the vocation before learning them. It is freely acknowledged that the reforms here advocated do not seem to offer a ready solution to the problem of selecting a candidate for a vocation by tests. Still it is possible that after a truthful analysis is made, the way may be open for the development of the needed technique of vocational selection and guidance. One who would be bold enough to defy conventions might suggest further that perhaps it will turn out that tests are not the best tools to use after all. It is conceivable that a better way may evolve out of a well-directed search for light.

Job Analysis a Continuous Process.—It should be understood that no vocation can be completely analyzed. Vocations are evolutionary in their nature. New ones are arising; others are dying off; new processes are being invented, new machinery and new materials. Accordingly the ideal that should guide the analyst is: there is always room for improvement in methods of work; there are always new facts to be discovered; there is always

room for improvement in methods of learning. With such conceptions he will conduct analysis continuously.

Uses to Which the Results of Analysis May be Put.— The attempt has been made in this chapter to give an all-around view of vocational analysis; to show how intimately several aspects interlock; to describe in detail the methods that should be used in making psychological analyses; to show that the same principles may be used in analyzing from the non-psychological points of view. We may now point out the number and variety of services that this scientific analysis may render:

1. It will reveal errors and wastes that may be present in an operation, thus reducing the worker's fatigue and bringing profit to both worker and employer.

2. It will furnish basis for determining how much and what kind of work an employee should do in a given time.

3. It will assist in scientifically setting a wage consistent with the amount of work done.

4. In connection with jobs involving the use of machinery it may give information regarding more effective ways of adjusting, operating, and maintaining machines.

5. The cost department may use accurate measures of the units of a job in estimating more closely the cost of new jobs about to be contracted for.

6. Analysis may conceivably be used in arranging harmonious grades and routes of promotion, showing the points of overlapping in the duties and qualifications involved in various jobs, and indicating at what stages workers travelling various routes may be interchanged.

7. Scientific analysis is an indispensable preliminary to the invention of a trade test.

8. It is a prerequisite to the proper administration of vocational education. Analysis of an occupation at the various stages in the acquisition of skill may reveal the rate at which normal progress may proceed; will show the points of peculiar difficulty; and will form the basis for attempts at devising new methods of instruction. Most important of all is the fact that this scientific analysis gives results that are valid. They deal not with opinion, but with measured fact. They permit one to

say "I know." And thus they constitute reliable foundation-stones on which to build a curriculum.

From these remarks it will be seen that a scientific method of vocational analysis will result in many benefits not specifically planned for, as happened in England when the Industrial Fatigue Research Board, organized during the war in order to "promote better knowledge of the relations of hours of labor and of other conditions of employment, including methods of work, to functions of the human body," discovered facts and developed techniques which have since been found directly applicable to the solution of problems other than those at first proposed. Analysis is really a method leading to the solution of all industrial problems connected with the worker. How much is a job worth? Which is better, a nine-hour or an eight-hour day? How much should a man be expected to do in a given job? Which are preferable for given jobs, married or single workers, men or women? The answers to all of these questions, which at present are based chiefly on opinion, should be sought through the application of the exact methods of science such as have been described in this chapter.

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CHAPTER V

PHYSICAL SIGNS OF APTITUDE

Historical Survey.—Though the signs and causes of maladjustment mentioned in the previous chapters are recognized to be of some importance, the chief cause is generally held to be that the ill-adjusted individual is handicapped because he was not 'cut out' for the vocation in which he is trying to succeed. This goes on the assumption that every individual is born with certain capacities that will make him fit into one vocation. If he finds that field he will be successful, if he does not, he will be unsuccessful. Following the assumption that he is born for a calling, has come the opinion that it is possible to discover vocational abilities or 'bents,' through reading certain physical signs. Accordingly, anxious search has been made for signs that will reveal hidden 'bents.' Attempts have been made to find the signs in regions as remote as the stars. Particularly serious attention has been paid to the physical make-up—to the contour of the head, height of the forehead, and other traits. So important a place has this search for signs occupied in past efforts toward vocational adjustments, that even though we may decry their existence and refute their claims, we are still obliged to consider them in order to give an historically complete treatment of the efforts that the world has made in the direction of vocational adjustment. All apart from the fallacious use that has been made of the so-called physical signs of vocational aptitude there is, of course, a chance that there may be some relation between the physical make-up of an individual and his likelihood of success in some vocations. Accordingly, we shall devote some attention to a treatment of the question.

Position of the Stars.—As said before, the search for signs of vocational aptitude has extended into all crannies of the earth and the heavens. Following a custom inaugurated when man did not know the relation between causes and effects as science has disclosed them, some people have looked to the arrangement of

the stars for light showing what vocation a child should enter. In spite of the ridiculousness of the idea that the position occupied by Jupiter on the night a child was born should have any connection with his success as a butcher or a bishop, the teachings of astrology, long ago discredited, still persist, and are believed by some, as is evidenced by this passage taken from an issue of a newspaper that calls itself the "world's greatest newspaper."

"The sun in conjunction with Jupiter makes this a most fortunate planetary rule. Almost any undertaking, be it pleasure or business, should meet with satisfaction under this sway. Jupiter gives power to all who lead in business or the professions. Bankers should meet with benefit.

"Those whose birthday it is have the forecast of a lucky year for business.

"Children born on this day should rise in life, but happy marriages are not among the predictions for the girls.

"You have a remarkably retentive memory, and should make a success of anything involving figures. You are probably fond of indoor games involving brain-work, such as chess and bridge. You should have a good speaking voice, and would undoubtedly make a good public speaker.

"You are shiftless about money matters. You must learn to save; to think of the future. You must remember that all you will ever get must be the result of your own energies and exertions, and no one will help you to any great extent in your efforts. You are rather a flirt, and on this account quite apt to make mischief for yourself. Cultivate self-reliance and a little more modesty, and your life will be a fuller, happier one." [1]

Phrenology.—Among the other things that have been used as signs of vocational aptitude are lines in the palms of the hand, characteristics of the handwriting, the objects which an infant selects from a number of symbolic objects on his first birthday anniversary. One set of signs that are widely believed in are the bumps on the head. This system, called phrenology, became formulated and systematized during the early part of the nineteenth century, with fundamental hypotheses as follows: The skull is divided into twenty-six areas; the brain inside the skull

[1] Chicago Daily Tribune, May 5, 1923.

is divided into twenty-six areas, each one corresponding to one of the twenty-six on the skull; the mind (that immaterial thing of which the brain is considered to be the organ) is divided into twenty-six 'faculties,' one corresponding to each of the twenty-six areas of brain and skull. Any special innate excellence of one of these faculties reveals itself in an unusual prominence in that part of the skull attributed to the faculty. And any development, during life, of one of these faculties is accompanied by enlargement in the appropriate cerebral and osseous parts.

The twenty-six faculties of which the mind is said to be composed are grouped into two main divisions: Intellectual faculties and Feelings. The former are subdivided into *perceptive* and *reflective* faculties. Among the first-named are the faculties of language and of form; among the second, the faculties of comparison and association. The Feelings are also divided into two groups: *propensities* and *sentiments*. The former are such active traits as destructiveness, constructiveness, amativeness, pugnaciousness; the latter are more passive—self-esteem, cautiousness, wit, veneration.

Thus an individual who has a slight protuberance on the portion of his skull immediately behind the ears is said to have the 'language' faculty well developed. The inference is that he should be a professor of linguistics, a translator, or something of the sort.

This is an exceedingly picturesque doctrine, and it would appear to lead to a happy and easy solution to the question of vocational adjustment—if it were true. When the skeptical eye of scientific inquiry is turned on it, however, it is seen to be untenable. The reasons are as follows:

Objections to Phrenology.—The configuration of the skull does not correspond exactly with the configuration of the brain. The skull varies in thickness. A protuberance in a certain locality, therefore, does not necessarily imply a corresponding protuberance on the brain.

Still more serious objection comes from the fact that the brain is not divided into twenty-six specific areas for the mechanization of twenty-six faculties such as those on the phrenological list. It is arranged on a different plan. Certain areas

contain the endings of nerves from the organs of sense. In the back lower part are the nerve-endings from the eye; in the area above the ear are those leading from the skin. On the top nearer the front are found the starting-points for nervous impulses leading from the brain to the muscles of the body. The greater part of the surface of the brain is taken up with nerves that connect these elementary nerve-endings together. Though there are areas in the brain, no one of them serves any complex activity like 'destructiveness,' 'constructiveness,' and the like. When a builder constructs a house, for example, he uses not merely one area of his brain, but the entire brain—the visual area for seeing, the auditory for hearing, the motor for hammering, and the association fibres which connect up the other elementary areas.

The contention that a development in one area is so gross that it can be detected through the skull appears absurd in view of the fact that the portions of the brain which develop are minute nerve-fibres of microscopic size. Their development consists in connecting up with other fibres in great complexity. Since all these structures are microscopic in size, it is clear that they cannot be detected by the fingers through the skull.

The next error in phrenology is psychological. There is no ground for saying that the mind is divided into twenty-six faculties such as those named. Genetic searches into the origins of the various mental processes in the lifetime of individuals have shown no such separateness when one or the other of these 'faculties' begins and reaches a climax.

The final ground for the rejection of phrenology is that its advocates and practitioners have adduced no factual evidence supporting it. In order for it to be scientifically valid it should be supported by figures. For example, to prove that a slight protuberance behind the ear means the possession of unusual skill in language, one should take several hundreds of linguists of acknowledged skill and show that the majority of them have a bump there a certain number of millimetres in height, while several hundreds of persons who are known to be poor linguists do not have the bump in that place, or do not have a bump so high. In other words, such doctrines can be accepted only after

they have been subjected to proof by the rigorous scientific procedure laid down in Chapter One.

'Character Analysis.'—Within recent years the popularity of phrenology in the diagnosis of vocational aptitude has been supplanted to some extent by another system of so-called 'character analysis.' This, exploited chiefly by Blackford, but taught by many others in one guise or another, holds that there are nine physical traits—color, form, size, structure, texture, consistency, proportion, expression, condition—each of which is associated with some particular mental trait. The system may be illustrated by reference to the first of the physical traits—color. Dark color is associated with the mental trait, inactivity. The way in which these two traits became associated is described in picturesque terms. They arose in response to certain environmental influences that played on the first beings who developed the traits. Brunettism arose in a tropic climate where the sun's rays fell with vertical fierceness. In order that the delicate structures under the skin might not be injured by the actinic rays, there was developed in time a protective layer of pigments. While the environment was having this effect on the physical nature of the individual, it was having a parallel effect upon the mind. Under the balmy air of the tropics, where food dropped into one's lap, where clothing was unnecessary, where shelter was scarcely needed, the organism developed habits of sloth and laziness—at the very least, inactivity.

Blondness arose under exactly opposite conditions; in a cold climate, where the sun's rays came down feebly and obliquely; and where in order to get any warmth, the skin remained relatively free from pigmentation. Food, shelter, and clothing were secured only with great effort; in order to keep warm it was necessary to maintain great activity. These circumstances produced blondism on the physical side and a tendency toward activity on the mental side. By inheritance these pairs of traits have been transmitted *as pairs* from one generation to another until now whenever a person is found with one of these physical traits, he may be assumed to have its corresponding mental trait. The significance of the other eight physical traits is explained in similar fashion. (4)

Objections to Character Analysis.—Though this system is very ingenious and, with its appeal to the doctrine of evolution, seems to have a scientific foundation, it is really founded on nothing but speculation. It has several deficiencies that make it quite untenable:

1. Two physical traits may be present within the same individual which denote exactly opposite mental characteristics. Thus, a high-bridge nose (which Blackford alleges is associated with great activity, because it was evolved in cold regions where it was desirable to develop much air-space in the nose, where the air might be warmed before passing to the lungs) may be, and frequently is, associated with brunettism, the index of inactivity. Should such a case be classed as 'active' or 'inactive'?

2. Again, the theory that one trait, for example, blondness, can be passed down from one generation to another and invariably carry with it another trait, like 'activity,' is contrary to what is known about inheritance. For it has been established that one trait may isolate itself from other traits in the case of any individual, and though one descendant might be born a brunette, the corresponding (?) mental trait of inactivity, even granting the possibility of such association, might skip this person.

3. A most cogent argument is the simple fact that character analysts do not agree among themselves. One character analyst advises a 'client': "You should be a civil engineer;" and another tells him: "You should be a teacher." One tells him that he is quick-tempered, while another diagnoses him as phlegmatic. This lack of agreement in itself shows the unreliability of all the advice given.

4. Finally, the theory must be rejected because it is supported by no actual investigations. Before using it as a valid guide for a decision regarding a life-career, one should have investigated hundreds of cases. To prove that brunettism indicates inactivity, for example, it would be necessary to select hundreds of brunettes and hundreds of blonds, and see if the mental trait of activity is more frequent among the latter than among the former. In other words, before any particular physical trait can be pointed to as indicative of a particular mental trait it must be

proven to be so by scientific investigation. Such investigations are lacking in the writings of the character analysts.

Sources of the Apparent Success of 'Character Analysts.'—The question should now be answered, How do the practitioners of such things as phrenology and 'character analysis' make their apparently satisfactory diagnoses of vocational and other abilities?

They make general remarks which seem to be especially fitted to the person being diagnosed, but which really may be applied to almost everybody. For example, they declare in a portentous tone of voice, "Your forehead shows that you have great power to judge people." Now this is a perfectly safe statement to make to any one. Everybody has the ability to judge people to some extent, and everybody exercises this power every day. Furthermore, every one probably thinks he can judge people unusually well. Accordingly he believes. The frequency with which such general, and usually complimentary, traits are named may be judged from the following 'readings' made by a character analyst for readers of a newspaper who submitted their photographs for 'diagnosis':

Case No. 1. (A young lady.) "Eyes and forehead of a quick, practical thinker. Nose of aggressiveness. Expression of business judgment. Features in general have the marks of a good mixer and one who will later have a good understanding of people. Suggest a higher education, specializing in a business or secretarial career."

Case No. 2. (A young man.) "If you will study the expression in this face you will quickly discover a friendly and considerate personality. The lips are those of sympathy and affection. The eyes indicate a thoughtful and clean mentality. The forehead shows he likes to deal with the practical, while the nose indicates an average amount of push. The quiet and peaceful aspect reflecting through the expression classifies him with the group of men who find their greatest happiness in work in which they unselfishly devote their lives to the betterment and service of others."

Case No. 3. (A young man.) "Here is an interesting type. The brows and forehead indicate quick and keen practical think-

ing. The high head shows leadership, while the nose and chin express activity. This type shows ability to mix with and get along with people. His line of work should indicate the meeting of and dealing with the public. Suggest banking, insurance, stocks and bonds, secretarial work, or the like."

These 'fortune-tellers' work under the advantage of a certain amount of prestige already developed in their favor—a reputation for possessing some mysterious power of divination. And this reputation serves to confer the stamp of veracity upon everything they do and say. As a result, even their most commonplace statements come freighted with the solemnity of the utterances of an oracle.

They make many of their 'diagnoses' on the basis not of fixed anatomical characteristics, but of acquired characteristics—expressive lines which any observant person can read. They judge by the lines on a person's face whether he is predominantly cheerful or habitually gloomy. They judge by his movements whether he is quick or slow, nervous or calm. There is nothing mysterious or occult in this. Any one can do it.

Finally, they make long guesses, which, because of the other things just mentioned, are right about 50 per cent. of the time.

True Way of Determining the Relationship between Physical Traits and Vocational Aptitude.—By our criticisms of these systems which attempt off-hand to diagnose vocational aptitude through the observation of physical characteristics we do not mean to imply that there is no relation between the two. We only mean to assert that whatever relation exists must be disclosed by means of scientific investigation. Large numbers of workers in various vocations must be measured with respect to physical traits, and only when one physical trait is unmistakably present among the members of a particular vocational group and is unmistakably absent or is found in less degree among persons who cannot qualify in the vocational ability concerned, only then, can the physical trait be said to be associated with the vocational ability. Several examples will be cited showing how this principle should be applied:

Intelligence as Estimated from Photographs.—In order to secure a measure of the accuracy with which intelligence may

be judged from general physical appearance, Pintner measured with psychological tests the intelligence of a number of children. He then gave photographs of these children to a number of persons, physicians, psychologists, teachers, with the request that they arrange the photographs according to the intelligence which they estimated each child to have. When compiled, the rankings of these observers were found to be far removed from those made according to the tested intelligence of the children. The reason is that very frequently a person who possesses "the sparkling eyes and bright face that conform so well with our popular conception of 'brightness'" is really subnormal. Pintner's investigation, to which the interested reader may turn for more detailed description, proves that an accurate estimate of intelligence cannot be secured by observation of physical features. (11)

Anderson conducted a similar investigation, giving photographs of a number of persons to twelve judges (graduate students and instructors in psychology). Intelligence tests had previously been given to the persons whose photographs were to be ranked. The rankings made by the judges were then compared with the standings of these persons in intelligence. The accuracy with which the judges estimated the intelligence of the subjects may be seen from the following table. The per cents of accuracy were obtained by dividing the number of correct judgments by the total number of judgments to be made.

TABLE IX

Judge	Per cent. accurate
A	64
B	55
C	59
D	54
E	47
F	62
G	52
H	52
I	47
J	47
K	52
L	52
Average	54

From these figures it appears that the likelihood that the accuracy of estimations of intelligence from observations of physical appearance is only slightly greater than chance. (2)

Scientific Refutation of Blackford's Claims.—The exact methods of science have been used with similarly devastating effect upon the theories of Blackford already referred to. Starting with Blackford's statement that "the normal blond has positive, dynamic, driving, aggressive, domineering, impatient, active, quick, hopeful, speculative, changeable, and variety-loving characteristics; while the normal brunette has negative, static, conservative, imitative, submissive, cautious, painstaking, patient, plodding, slow, deliberate, serious, thoughtful, specializing characteristics," Paterson and Ludgate secured ratings on about 400 blonds and 400 brunettes with respect to each of these traits, and found that blonds and brunettes had the so-called 'blond' and 'brunette' traits in about equal proportions. (10)

A study of actual cases made by the author revealed similar discrepancies between the Blackford theory and actual fact. Blackford says that persons of mechanical bent are typically blonds. The author examined 400 workers in the metal trades, who can surely be classed as mechanically inclined, and found that 52 per cent. were medium in color (that is, light, medium, or dark brown), while of the remaining 48 per cent. 16 per cent. were blond and 32 per cent., or twice as many, were brunette (black). (9)

An extremely detailed investigation of Blackford's claims was made by Cleeton and Knight, who selected eight character traits: sound judgment, intellectual capacity, frankness, will power, ability to make friends, leadership, originality, impulsiveness, traits concerning which there seemed to be closest agreement on the part of various character analysts. The investigators then arranged for a number of individuals to be rated by close associates according as they possessed these traits in large or in small amounts. The investigators then examined the subjects to see if they had the physical traits alleged to accompany these eight character traits. For example, since sound judgment is alleged to be indicated by great breadth between the eyes, the investigators took the subjects who had been rated as having sound

judgment to a marked degree and measured in terms of millimetres the distance from the centre of the left eye to the centre of the right eye. They then took the individuals who had been rated as deficient in sound judgment and measured their eyes in the same way. They found no greater breadth in the former group than in the latter group. After investigating in this way scores of other so-called physical signs of aptitude these scientists concluded that such contentions of the character analysts do not have scientific validity. (5)

Investigation of Height and Weight of Executives.—One investigation that seems to give scientific evidence of a positive relationship between a certain physical trait and a broad type of vocational ability is that of Gowin. He tabulated the heights and weights of 1037 leading men, such as governors of States, United States senators, mayors of leading cities, bishops, and railroad presidents. He found that they were on the average 71.4 inches in height (with shoes) and 181.1 pounds in weight. These figures are greater than those for persons more nearly representative of the population at large—221,819 applicants for life insurance, with an average height of 68.5 inches and an average weight of 166 pounds. Furthermore, among the executives examined, those in the more responsible positions were larger, in general, than those in positions of less responsibility. The investigator concluded, therefore, that in executive work, which requires the exercise of leadership over people, physical bulk is an asset. (7)

Height and Weight of Salesmen.—The theory has been advanced that perhaps unusual height and weight are assets in other vocations, notably salesmanship, the theory being that by means of bulk and the suggestion of physical superiority a salesman can overawe his customers and compel them to buy. In order to test the validity of this hypothesis the author made a scientific investigation according to the principles laid down in this book. Records were secured from two firms, Company A, employing 95 men selling a high-grade office specialty; and Company B, employing 90 men selling footwear. The salesmen were ranked according to the commissions they earned during one year (in the one case, in 1920, and in the other, in 1921); and

TABLE X

Showing Number of Salesmen of Each Height, in Highest, Middle, and Lowest Groups of Sales Ability

Height in inches	Number of salesmen								
	Highest group			Middle group			Lowest group		
	Company A	Company B	Total	Company A	Company B	Total	Company A	Company B	Total
75							1		1
74									
73				2		2	2	2	4
72	6	4	10	1	1	2	7	2	9
71	4	3	7	6	2	8	6	4	10
70	7	7	14	1	2	3	1	4	5
69	4	4	8	6	6	12	5	5	10
68	3	4	7	7	9	16	5	6	11
67	3	5	8	2	5	7	2	3	5
66	3	3	6	4	3	7	3	4	7
65	1		1	1		1			
64	1		1	1	2	3			
	32	30	62	31	30	61	32	30	62

TABLE XI

Showing Number of Salesmen of Each Weight, in Highest, Middle, and Lowest Groups of Sales Ability

Weight in pounds	Number of salesmen								
	Highest group			Middle group			Lowest group		
	Company A	Company B	Total	Company A	Company B	Total	Company A	Company B	Total
230-239					1	1			
220-229	1	2	3		1	1		1	1
210-219		2	2		3	3		3	3
200-209		1	1		3	3	2	1	3
190-199	1	3	4	1	4	5		4	4
180-189	3	7	10	1	3	4	4	4	8
170-179	3	8	11	4	9	13	3	7	10
160-169	5	3	8	7	6	13	4	6	10
150-159	5	3	8	3		3	7	3	10
140-149	6	1	7	9		9	7	1	8
130-139	6		6	6		6	4		4
120-129	2		2				1		1
	32	30	62	31	30	61	32	30	62

on the basis of this ranking they were then grouped into three equal groups, those with the highest sales records in group I, the middle third in group II, and the third, with the lowest sales records, in group III. The average height and weight (clothed) of those in each group were then computed. Age was also included for what subsidiary value it might have. Results are shown in Tables X to XVII.

TABLE XII

Average Height, Weight, and Age of Men with Highest, Middle, and Lowest Sales Records (Company A)

Groups—formed on basis of sales records	Number of persons	Average height	Average weight	Average age
		inches	*pounds*	*years*
Highest third	32	69.0	155.7	31.2
Middle third	31	68.6	153.0	29.6
Lowest third	32	69.8	157.9	28.8
Total company	95	69.2	155.5	29.8
Average deviation		1.9	15.1	3.2

TABLE XIII

Average Height, Weight, and Age of Best Ten and Poorest Ten Salesmen (Company A)

Group	Average height	Average weight	Average age
	inches	*pounds*	*years*
Highest ten	69.3	157.4	31.6
Lowest ten	70.2	158.7	30.0

In order to be sure that extremes of ability were represented in these divisions, the best ten and the poorest ten salesmen were similarly grouped, with results as shown in Table XIII. The statistical device usually used for discovering the degree of correspondence between such factors is the method of correlation. This, applied to the men of Company B in terms of the Spearman foot-rule, shows that rank in selling ability correlates with rank in the physical traits as follows: height, 0.11; weight, 0.05.

These amounts are so small as to warrant the statement that there is no significant correlation.

TABLE XIV

Average Height, Weight, and Age of Men with Highest, Middle, and Lowest Sales Records (Company B)

Groups—formed on basis of sales records	Number of persons	Average height	Average weight	Average age
		inches	*pounds*	*years*
Highest third	30	69.3	180.2	44.4
Middle third	30	68.0	184.8	41.4
Lowest third	30	69.0	178.5	43.0
Total company	90	68.6	181.2	43.2
Average deviation		1.7	15.9	6.2

TABLE XV

Average Height, Weight, and Age of Best Ten and Poorest Ten Salesmen (Company B)

Group	Average height	Average weight	Average age
	inches	*pounds*	*years*
Highest ten	69.0	185.5	47.4
Lowest ten	69.1	182.6	43.1

All these figures show no appreciable difference in height and weight between the most successful and least successful of the salesmen in these groups. The most successful men in each company averaged about 69 inches in height, and the least successful averaged practically the same. The slight fractions of an inch in difference are in all cases smaller than the average deviations. The negligibility of height and weight is still more strikingly shown by a comparison of the earnings of the best and poorest salesmen of Company B. Since the amounts were given in confidence they are not here presented. The difference, however, between the average commissions earned by the best third and the poorest third is $3750; that between the average commissions earned by the best ten and the poorest ten is $8000. Surely if

stature were a factor in selling ability it would manifest itself among men with this wide divergence in achievement! No appreciable difference appears, however; hence, it may be concluded that height and weight play little part in determining a salesman's success. At least it is certain that the best salesmen in this group of approximately two hundred salesmen are not on the average the tallest, and that they are not the heaviest, but that they are men of medium size, averaging around five feet and nine inches, with appropriate weight (except those of Company B, who are, on the average, somewhat heavier, being, on the average, older). (See Tables XIV and XVI.)

It might be alleged that the reason why these superior salesmen are, on the average, of medium stature is that by the law of chance there would be a larger number of medium-sized men on these sales forces. This is exactly true. The number of men of

TABLE XVI

Combined Number and Per Cent. of Salesmen from Companies A and B, Distributed in Tertiles Horizontally, According to Salesmanship, and Vertically, According to Height

Height	Salesmanship						
	Number of men				Per cent. of men		
	Tertiles	1	2	3	1	2	3
	1	23	13	26	37	21	42
	2	20	22	19	32	36	32
	3	19	26	17	31	43	26

TABLE XVII

Combined Number and Per Cent. of Salesmen from Companies A and B, Distributed in Tertiles Horizontally, According to Salesmanship, and Vertically, According to Weight

Weight	Salesmanship						
	Number of men				Per cent. of men		
	Tertiles	1	2	3	1	2	3
	1	22	19	21	35	31	34
	2	18	24	19	29	40	31
	3	22	18	22	36	29	35

each height and weight on these sales forces follows closely the probability curve. (See Tables X and XI.) But if, as is alleged, tallness and heaviness were a factor in superior salesmanship, the superior salesmen should be larger than the inferior ones. And the inferior salesmen should be smaller than the others. That is, there should be a preponderance of tall and heavy men among the superior salesmen, and a dearth of them among the inferior salesmen.

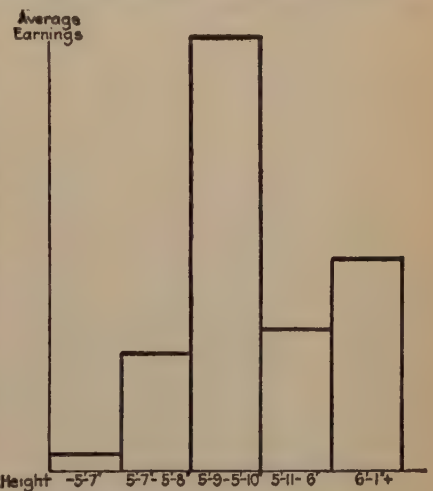

FIG. 7.—Relative average commissions earned by insurance salesmen of various heights.

This condition is not found, however. Tables XVI and XVII show the combined number of salesmen from Companies A and B, distributed in tertiles, horizontally according to salesmanship, and vertically according to height and weight. Absolute numbers are shown on the left and per cents on the right. Among the superior 62 of the 185 salesmen are 23 who are in the tallest third; and among the inferior third are 26 who are also in the tallest third. Among the tallest third are 23 who are in the superior third of the salesmen; and among the shortest third there are 19 who are among the best salesmen. There seems to be a tendency for the men of medium height to be equally distributed over the three grades of salesmanship; and for the tall and short men to be distributed somewhat less equally. However reliable this may be, the figures certainly show that there are no more tall men among the best salesmen than among the poorest.

Table XVII shows no consistent differences in weight among the salesmen making the best, medium, and lowest sales records;

almost an equal number of heavy men being in each group and an equal number of light men being in each group.

[It is worthy of comment that Johnson found the average height of his leading salesmen to be 5′ 10.7″, compared with an average height of 5′ 9″ among those who failed. (8)]

Additional evidence confirming our conclusions is contained in measures of 400 insurance salesmen kindly furnished by Mr. J. M. Holcombe, Jr., manager of the Sales Research Division of the Phœnix Mutual Life Insurance Company. These are presented in Figures 7 and 8. Actual earnings of the men are not shown. The graphic presentations, however, give true pictures of the relative earnings of the men at different heights and weights. Here it is clearly shown that the best salesmen are not men of superior size. True, the extremely large men sell somewhat more than the extremely small men, thus giving some apparent ground for believing in the theory that bulk is a factor in making a salesman 'impressive.' It must be remembered, however, that there are other qualities besides impressiveness which are necessary for carrying on the duties of a salesman. Among them are energy and activity. The good saleman must be a quick mover and must call upon a great number of clients. Here the large man is handicapped by the necessity of carrying around an undue amount of weight. And the small man, perhaps because he is not thus handicapped, can partially overcome any hypothetical

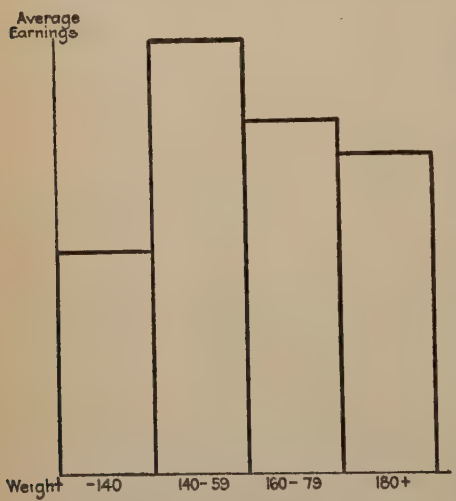

Fig. 8.—Relative average commissions earned by insurance salesmen of various weights.

'unimpressiveness' due to small stature. But the man who makes the most sales among these insurance salesmen is the man of medium size, who is under neither the handicaps incidental to great bulk nor those incidental to small stature.

What is the Height of the 'Average' Man?—It is worthy of remark that Johnson, in making similar measurements of salesmen (insurance), found an average height of 5′ 9.5″ ; and he concludes that this is the best height for salesmen, averring that it is somewhat above that of the average man. He asserts that the height of the 'average' man is 5′ 7.5″ ; and that the salesman, being two inches taller, can exercise the power of 'dominativeness.' He does not tell the source of his figures for the height of the 'average' man. Measurements of soldiers in the World War have been quoted in this connection to support the belief that the 'average' man is 5′ 7.5″ in height, this being the figure published in the statistics of the Surgeon General's office. (6) There are, however, several obstacles to the unqualified acceptance of this as the height of the 'average' man to be used as a standard of comparison with special groups. In the first place, the measurements in the army were made without shoes. With shoes added, as they were in the case of these salesmen, the height would undoubtedly reach 5′ 8.5″. But this is not all. The

TABLE XVIII

Mean Height by Age Groups of Five Years, from 17 to 45, of 190,621 American-born White Men Found Fit for Military Service (Civil War)

Age	By quinquennial groups		
	Number measured	Per cent. of total	Mean height
			inches
Under 20 years	46,855	25	66.57
20 and under 25	52,393	27	67.82
25 and under 30	31,757	16	68.10
30 and under 35	23,174	13	68.22
35 and under 40	20,692	11	68.30
40 and over	15,750	8	68.23
Total	190,621	100	67.69

men in the army were predominantly youthful and had not reached their full stature; the average age was 25 years, median, 24. Quetelet has shown that full stature is not reached until after the age of 30. (12) This is also shown by statistics gathered at the time of the Civil War. See Table XVIII. (13)

The amount of growth between the ages of 20 and 34 (the average age of the salesmen reported on above was 30) is approximately .4 inch. If this were added to the average height of drafted men the latter would be on the average 5′ 8.9″. Thus we see that the salesmen investigated are not appreciably taller than men in general. While the extremely tall salesman may in the long run possibly excel the extremely short salesman, he will not excel the salesman of average height. Indeed, the figures show that he will not do so well as the man of medium height, and that the word medium can be considered as practically average, 5′ 9″. Accordingly, we should not be justified in looking to height as a physical criterion of success in salesmanship.

Though not Reliable Signs, Physical Traits May be Important.—Although we have experienced a dearth of authentic physical signs of vocational aptitude, we need not necessarily conclude that physical traits are negligible. In some vocations there are certain physical traits that are indisputably required. For example, to be a patrolman on the New York police force one must be at least 5′ 7½″ in height and 140 pounds in weight (stripped); to obtain a place in the chorus of the Follies certain elements of physical pulchritude are essential. (Though it is by no means certain that to become a star in musical comedy one must come up to a certain physical standard. There are numerous examples of stars who attained their positions without the standard physical signs of beauty.) All things considered, we are forced to conclude that there is at present little basis for regarding any one physical trait as an index of any vocational aptitude. Whatever physical traits are required in any vocation, their essentiality must be determined by the arduous method of scientific investigation illustrated in this book.

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CHAPTER VI

INTELLIGENCE AS A FACTOR IN VOCATIONAL ADJUSTMENT

Definitions of Intelligence.—Among the leading factors in vocational adjustment is undoubtedly intelligence. Before proceeding to show the part played by it we should specify what we mean by it. We must grant at the outset that the term is not used with perfect understanding even by psychologists. Generally speaking, it implies something like common sense, brightness, mental alertness, and that thing which our Yankee ancestors colloquially called 'mother-wit.' "The pursuance of future ends and the choice of means for their attainment are the mark and criterion of presence of mentality." This statement of James,' when critically examined, is seen to include many of the things that we mean by our use of the term in every-day life. We rate as low in intelligence an individual who selects unworthy aims or no aims at all; or one who employs ineffective means for reaching them. We say that the man who cannot neglect present and ephemeral pleasures for the sake of future good is displaying poor intelligence. (4)

Another view is that of Thorndike, who conceives of intelligence as an aggregate of abilities, not related in themselves, infinite in number, and ranging through many degrees. He was led to this conclusion by practical considerations as well as by the fact that various tests purporting to measure various abilities do not show that the manifestations of these abilities are highly correlated. (15)

A different view has been taken by Spearman, who conceives of intelligence as made up of one central factor (*general* intelligence), which is supported, as it were, by *special* factors. Spearman came to his conclusion after discovering that the standing of a given individual in one mental activity, like learning Latin, might vary from his standing in another activity, like playing the violin; but that there was enough of similarity in

the standings in these various activities to warrant the belief that there is a common ability underlying these specialized manifestations.

We shall not review all the formulations of intelligence that have been made. It is sufficient to point out that psychologists have changed their emphasis, and instead of phrasing the question, "What is intelligence?" they are trying to answer the question, "What can intelligence do?" In other words, they do not regard it as a static entity, but as an activity. And while they are not unanimous in their conception of its dynamic nature, they at least agree closely enough, so that they use similar methods in dealing with it. As a dynamic, active agent, intelligence is usually defined as "the general capacity consciously to adjust one's thinking to new conditions of life." A good synonym is 'learnability'; "not merely to learn in the sense of memorizing . . . . but ability to assimilate, to coördinate and subordinate items of fact, to appraise them and utilize them in further thinking; especially in prevision, in anticipating the outcomes of situations both real and imaginary." In accepting this conception let it be understood that psychologists do not consider it to be the last word. It is merely a working hypothesis which they have adopted. Spearman suggests that a better term to use would be the mere symbol *g*. As generally conceived it has several characteristics:

Intelligence is a General Trait.—Theoretically an individual manifests his intelligence in everything he does; in laying bricks, making investments, translating French, playing tennis. And if other conditions were equal he should be able to adjust himself in all these fields with equal facility. Actually, however, there are conditions that prevent this equality of ease in adjustment. An individual may be adept at laying bricks but inefficient at playing tennis; he may be skilful at translating French and unskilful at the solution of problems in algebra.

There are at least two ways in which these apparent discrepancies may be explained. One is that these practical adjustments (bricklaying, etc.) require abilities other than intelligence. They require certain physical abilities such as flexibility of muscles and joints; or they require physiological powers such as

keen vision; or they evoke different emotional attitudes such as feelings and desires, which are not intelligence at all. For example, it is entirely possible that a college student who is fairly able in most subjects might be rather slow in a single subject like history. The reason need not be intellectual; it may be emotional. The first contact he had with history might have been unpleasant; perhaps he had a disagreeable or an ugly colored text-book or an uncongenial teacher, and these unpleasant associations formed at an early age may have colored all his later adjustments.

Another way of explaining such discrepancies is to say that the different adjustments in various situations may be affected by previously formed habits. If, during early childhood, one forms habits of making adjustments in a certain field, say mechanical, and neglects the more strictly intellectual field, he is likely, in later life, to be especially able in mechanical lines and awkward in intellectual lines. Conversely, if, in early life, one stresses intellectual activities, and neglects the formation of motor habits in the field of mechanics, or of sports, one is likely to have difficulty in adult years when he tries to make motor adjustments.

Despite the frequency with which such discrepancies seem to occur (and the frequency is probably exaggerated) it is quite likely that in the long run each person displays about equal facility at many tasks, especially at mental tasks. This is especially likely to be true of persons of extremely high and extremely low ability. Benjamin Franklin, for example, who was very able as a printer, was equally able as a writer, diplomat, inventor, etc. A student who stands very high in history is likely to stand correspondingly high in English, Greek, etc. On the other hand, a student who is stupid in history, geography, and so forth, is quite likely to stand low in other subjects. The most of the variations from this rule occur among persons in the moderate ranges of ability, and are probably accounted for by the explanations given above.

Intelligence is Abstract.—We must readily concede that the thing we are calling intelligence is abstract. It is not a single entity. Regardless of our efforts, we can never put our finger on

it. All we can reach is some expression of it through school performance, quantity and quality of work, earnings, test-scores, and the like. Each of these expressions is incomplete in itself and is inadequate as an expression of intelligence. The aim in all our measurements is to evoke a number of manifestations of it, to pool them, and call the result a measure of intelligence.

Intelligence is Distinct from Knowledge.—By intelligence we do not mean the amount of knowledge that one has been able to acquire. A person may be very well educated and still not be highly intelligent. Such a person is sometimes referred to as an 'educated fool.' Again, one may be illiterate and still be quite intelligent. Many of the pioneers in America were of this type. They are not so numerous today, because facilities for securing an education are much more common, and the highly intelligent person who lacks education is bright enough to see that he cannot progress very far without it, and so he takes steps to secure it. The case of Abraham Lincoln illustrates this. Regardless of the fact that the two are usually found together, however, they should not be confused. Intelligence and knowledge are not the same thing.

Intelligence is Distinct from Emotion and Will.—According to the view most generally adopted, intelligence, being purely intellect, is not feeling and emotion, nor is it will. One may be highly intelligent and be of an excitable temperament, or of a phlegmatic temperament. So may one be highly intelligent and lazy, or highly intelligent and industrious, honest or dishonest, and so on. Perhaps among the very intelligent there is a higher degree of emotional and volitional control. The very intelligent man can see that it is to his interest to be honest, industrious, self-controlled, and so he seeks to develop these traits. But it must be remembered that only a relatively few individuals are *highly* intelligent, certainly no more than 25 per cent. The majority are of medium intelligence, which is not very high. Among these persons, the emotional and instinctive urges are sometimes stronger than the intelligence, if we may speak of such dissimilar things in the same breath, and so the intelligence is not strong enough to control them; consequently, while a person may stand at a given level of intelligence, he may fall

short of manifesting a corresponding degree of emotional or volitional power. All things considered, we are probably safe in thinking of intelligence as being separate from emotion and will; we shall show the practical significance of this doctrine at other points in our discussion.

The Degree of Intelligence is Fixed Within Each Individual at Birth.—The evidence at present available indicates that the degree of intelligence possessed by an individual is fixed at birth. It is really inherited from his ancestors. There are several lines of evidence for this: When one traces the members of a family during several generations, one finds the various generations manifesting about the same kind of intelligence. Particularly is this true of families of exceptionally high and those of exceptionally low intelligence. For examples of the first kind the reader is referred to "Hereditary Genius," by Galton (1); for examples of the second, to "The Kalikak Family," by Goddard (3). Another line of evidence comes from the fact that members of a family within the same generation show a close agreement in intelligence. A third line of evidence comes from the fact that measures made of individuals with scientific intelligence tests, show that an individual does about the same kind of work time after time. These rules are only general. There are exceptions to them. But the exceptions are accounted for by biologists on rather elaborate theories which we cannot discuss here. One should not be troubled by the exceptions when there are so frequent examples of uniformity.

Physical Basis of Intelligence.—If we adopt the generally accepted view that the degree of intelligence is inherited, we must ask in what its inherited nature exists. It comes, say the biologists, from a particular conjunction of "chromosomes that come together with the union of the germ-cells" as furnished by the parents. The particular part of the body in which the physical basis exists is, as all agree, the brain, or rather, the entire nervous system. Just what there is about a nervous system that makes its possessor more intelligent than another is not exactly known. The belief existed for many years, and still exists in some circles, that the size of the brain is the determining factor, that a large brain is the basis of intelligence of a very

intelligent man. This has been proven to be only a generality. A more plausible view is that intelligence depends first upon the "structure of the brain-cells which condition mental processes, and second upon the functioning of these cells." . . . . . "Intelligence is a matter of brain-cells and neurone patterns, and still more definitely, it is a question of the development of the larger association areas of the brain, the functioning of which develops relatively late, and hence, this development is particularly liable to arrest; moreover, when such arrest has taken place, there is no evidence that it ever starts up again." (2)

One would like to have more definite description of the neural basis of intelligence. In the attempt to make a more definite statement Woodworth says that one factor is undoubtedly the "fineness of the internal structure of the cortex." (20) A word that may possibly designate the basic neural quality is James' word 'plasticity,' which is defined in the dictionary as that quality which makes a substance give way to impressions. It does not give way all at once, however; it offers some resistance. Plasticity may be thought of still more concretely as involving several attributes: impressibility, conductivity, and retentivity. A highly plastic nervous system can be easily impressed by outside objects. A person with such a nervous system might learn the multiplication table of fives, for example, by having it impressed three times, while one who has a nervous system that is not very impressible might require 50 impressions.

Nervous systems seem to differ also in conductivity. Within the nervous system of a highly intelligent individual the impression once started travels quickly over a pathway from one nerve tract to another. In a person of low intelligence, the nervous impulse travels very slowly. The difference in rate of flow might be likened to the difference in the rate of flow of two streams, one a mountain stream and the other a stream on a flat plain. The one flows with torrential vehemence; the other moves along with agonizing slowness. The differences between the mental streams of individuals are readily observable, and can hardly be accounted for except by assuming some innate difference in the conductivity of the nervous structure underlying mental action.

The third component of plasticity, retentivity, is invoked to explain the fact that a highly intelligent person can retain things for a long time, while a less intelligent person cannot retain them as long or as easily. In order to account for this we may assume that a nerve tract which has been impressed has the power to retain the impression. This retention may take place at the synapse (the point of contact between two nerve-cells) or it may take place within the individual nerve-cells. Whatever is the basis, there is something that makes one person retain easily and another one retain only with great difficulty, and it seems reasonable to suppose that there is some capacity within the nervous system, call it retentivity, which serves as one of the physical bases of intelligence.

It should not be inferred that the possession of a given degree of impressibility is a guarantee that one will possess a corresponding degree of conductivity and retentivity. A person may be high in the one and lower in the other; he may be so easily impressed that he can learn a thing by a single impression, but he may not be equally retentive. It is because of the existence of persons of this type that the phrase, 'easy come, easy go' was invented. But this phrase should not be taken as descriptive of all cases. For there are many individuals who are both highly impressible and highly retentive. They represent the really superior minds at high levels of intelligence. There is, of course, the type of person who is not easily impressed, and who yet may be quite tenaciously retentive. That this type occurs is evidenced by the well-worn phrase, 'slow but sure.' It sounds so pat that the superficial observer is inclined to conclude that if a person is slow (requiring many impressions) he is nevertheless highly retentive. Such an assumption is not warranted, for many, probably most, of those persons who impress with difficulty also retain with difficulty. From these remarks it will be seen that the two traits, impressibility and retentivity, do not necessarily correspond with each other, nor with conductivity. All kinds of combinations are possible. Probably in the case of persons possessing these traits in an extreme degree, whether superior or inferior, there is a high degree of consistency; those who are extremely high in one tend

to be extremely high in the other respects, and those who are extremely low in one tend to be extremely low in the other respects; but those persons who are in the middle ranges with respect to one—and most persons are in this class—may stand at a slightly different position with respect to another one of the three traits. This probably accounts for many of the apparent inconsistencies shown by an individual in adjusting himself to different kinds of activity. It should be clearly understood that the explanations offered above do not constitute a perfect picture of the physical basis of intelligence. They merely represent what is probably the most likely condition. As investigations in brain physiology progress, probably more definite statements can be made regarding the physical basis of intelligence. It is worthy of remark, however, that the best view is that intelligence is not inherited as a 'unit character' subject to a single determiner in the germ plasm. The view just presented allows for the transmission of several unit characters that may be 'determiners' of intelligence.

Intelligence and the Probability Curve.—It is not enough to observe that persons differ in degree of intelligence. We should remark that they differ according to a fairly definite rule generally known as the probability curve. The matter will be made clear by reference to Figure 9, in which Goddard has shown graphically the measures of intelligence of recruits in the National Army. (2) A few, about 10 per cent., show very inferior intelligence; a corresponding few show very superior intelligence; while the great majority display a moderate degree of intelligence, a greater and greater number at each level until the exact middle is reached, where are found the most of all, at what may be called 'average intelligence.' The persons at the lower end of the scale, called subnormal, are objects of considerable attention at the present time. Those at the extreme point, even below the 'very inferior,' are technically classed as idiots; they are utterly deficient in intelligence; having not even the ability of a two-year-old child. They cannot feed or dress themselves; cannot talk or understand what is said to them. At a level slightly above these is another group to whom the word imbecile is tech-

nically applied. They have intelligence equivalent to that of children aged three to eight. They can learn to perform simple tasks, such as weaving baskets, making brooms, peeling potatoes, making beds, hoeing in the garden, and the like. Above these distinctly subnormal persons is another group manifesting a degree of intelligence roughly equivalent to that of a child of nine to twelve years, technically known as morons.

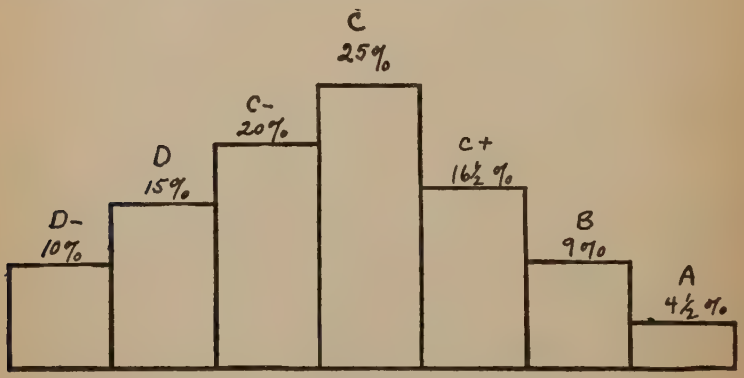


FIG. 9.

Showing the distribution of intelligence among the members of the National Army. From Goddard, *Human Efficiency and Levels of Intelligence*. Used with kind permission of Princeton University Press, Publishers.

They constitute a distinct social problem. Being deficient in intellectual powers, they fall easy prey to schemers, and so commit crimes for which they are not strictly accountable. Appearing, as they frequently do, to be persons of normal intelligence, they are sometimes entrusted with responsibilities that are too exacting for them, and so they make costly mistakes. They marry and propagate more of their kind, thus lowering the level of intelligence in the succeeding generations.

Above these lower levels of intelligence lie those members of the population whom we call 'normal' in intelligence. But we should not jump to the conclusion that these are all of the same level of intelligence. Just above the morons are a number who, while normal, are still very slow. They think slowly, they are inaccurate; they cannot reason well for themselves; they

seldom initiate; they are ineffective memorizers; in short, they are generally backward in their mental activities. Above them are other levels, fortunately, of higher and higher intelligence, until finally at the top is the highest intelligence that can be conceived; a type of intelligence that is sometimes called genius, by which is meant a mentality that can adapt itself quickly and effectively to the most exacting conditions, an intelligence like that of Socrates or Benjamin Franklin. (A number of observers at the Conference of Versailles have expressed the opinion that Venizelos was probably the most intelligent person in Europe.)

As is to be expected, the difference between the extremes of even normal intelligence is great. If the attempt is made to express the difference quantitatively, perhaps it is fair to assert that the individual at the top is at least four times as intelligent as the one at the bottom of the 'normal' group. As was said before, and as is indicated in Figure 9, the majority of the members of the population are found in the middle ranges of intelligence. In order to objectify the intelligence of persons on this level psychologists have resorted to a number of expedients. For one thing, they have attempted to describe it in terms of children of various ages. Estimates have placed 'average adult intelligence' as roughly equivalent to that of children between the ages of 12 and 16. It is generally held that the intelligence of children develops with chronological age, or physical growth, until at least the age of puberty; and then stops developing. At that age one is said to have adult intelligence. It is no longer proper, then, to speak of adult intelligence in terms of years. It is true, there has been a considerable amount said and written to the effect that the 'average' American adult is 12, 13, or 14 years old mentally. While it is probably true that the mentality of the average American, or person of any other nationality for that matter, is not so high as is popularly supposed, still it is incorrect to speak of adult intelligence in terms of that of a developing child. In order to express the differences between adults, some unit besides years should be chosen. Among units proposed are steps on the Army scale of intelligence, which run from 0 to 212. A still more usable method is to reduce the steps to units on a percentile scale. Thus one at the exact point of 'average'

adult intelligence would be said to be at the 50 per cent. point; one midway between him and the lowest person who could be said to have 'normal' intelligence would be at the 25 per cent. point; one midway between the mid point and the highest conceivable intelligence would be at the 75 per cent. point. Such designations are probably the soundest to use in designating the differences between the various levels of intelligence.

Are There Several Types of Intelligence?—It should be remarked that there is among some psychologists a conviction that intelligence should be regarded as having more than the one dimension implied by the term 'level.' There is the view that two persons on the same level might differ in respect to the kind of intelligence they possess. Thorndike distinguishes three such qualitative types: 'abstract' intelligence, such as is brought out chiefly by the activities of the traditional school curriculum, involving the manipulation of mathematical ideas, language, philosophical concepts and the like; another, called 'social,' which is brought out in one's dealings with people; and a third (which Stenquist and others have emphasized), called 'mechanical,' which is concerned chiefly with adjustments of a manual kind. (15) It is a matter of common observation that some persons succeed brilliantly in abstract fields like mathematics, but fail miserably in adjusting themselves to situations where they have to deal with people, as for example, in salesmanship; others succeed easily in the latter field, though they had trouble passing their studies in high school or college. Similar discrepancies occur in the adjustments made in the field of abstract thinking and in the field of mechanical skill. All these seem to point to the possibility that there are such different types of intelligence. Stenquist, after making investigations under scientific conditions, secured measures which he regards as conclusive proof that such differences exist. He measured several hundred boys with general intelligence tests of the kind purporting to demand 'abstract' thinking, and then measured them with a number of strictly mechanical tests requiring manual manipulation. He found a low correspondence between the two series of measures, and concluded that "an individual's position in general intelligence is thus shown to be largely independent

of his position in general mechanical ability and aptitude." . . . . "What is it that causes a pupil to stand out in this type of work? May it not be another type of intelligence that might well be called *general* intelligence?"

"Of the relative importance of these two types of ability readers must form their own conclusions. But it should be kept in mind that we are living in a world that is dominated on every hand by every known form of mechanical device and machine. Every moment of present-day life is influenced directly or indirectly by the products of mechanical skill and genius. Is it not important that ability in this field should be discovered and developed? Rather than merely to dismiss our apparently stupid pupils as low in 'general intelligence,' and to relegate them to some convenient class, our time might profitably be spent in disclosing other kinds of intelligence of which they may be possessed.

"Possibly it would be more appropriate to designate these mechanical tests by some other name, for they are mechanical only in a limited sense. On the mental side they call for the ability to recognize parts of ordinary mechanical devices, for the ability to make judgments as to the reasons for the particular size, shape, weight, and nature of the parts—in short, for the mental ability to think through in some degree in the same steps as those employed by the designer of each machine. Manually, they call for the dexterity required to put parts together to form the completed machine or device after it has been decided how they should go. Much of the performance of a typical child is, of course, mere trial and error manipulation, in which he hopes somehow 'to make the thing work.' But the nature of the various models is such that only a very low score is possible for the individual who depends merely upon thoughtless manipulation of the parts. A generous amount of the best kind of thinking is thus required to make a high score. It involves accurate perception, reasoning, and judgment applied to each model. In so far, therefore, as these mental processes are of general importance in every-day life, the ability demonstrated in assembling these models perfectly could well be called general intelligence." (12)

Interesting as these views are, we are not yet justified in

accepting a dual or triple intelligence as an established fact. While we cannot overlook the differences that exist in the skilfulness with which an individual may adjust himself in various fields, still we must recognize that there are involved in these adjustments other factors besides intelligence. In the social field there are the feelings and the emotions, which are by definition non-intellectual. There are also other factors that may be called volitional, such things as industriousness, aggressiveness, and the like, which are likewise non-intellectual. In the mechanical adjustments there are involved muscular coördinations aided or hindered by the degree of tonicity of muscles; in playing the piano, for example, by such things as the articulation of the bones at the joints; in singing, by such physiological things as the ability to distinguish between minute differences between tones. These are surely not all intellectual, and consequently cannot be included in the term intelligence. In addition to these facts it must be noted that one's aptitudes for abstract thinking, social contact, or mechanical manipulation are colored by early influences. One may form habits very early in life which make adjustment in one field easy but which give rise to inhibitions in another field. These facts seem to offer some obstacle to the assumption that there are a number of types of innate intelligence. Their influence will be considered in greater concreteness in a subsequent chapter.

The Measurement of Intelligence.—Coördinate with the development of the concept of intelligence has grown a desire to measure it. Indeed, as far back as we can trace man's attempts to psychologize in even a practical unscientific way, we may discern attempts to gauge potential intelligence or something like it. Account has already been given of the use of phrenology and physiognomy for this purpose. An outline of subsequent attempts will now be given. The history may be divided into several periods.

Anthropometric Tests.—On the hypothesis that perhaps intelligence is determined by various physical features, many measurements were made of such things as height, length of bones, weight, especially of growing children, in order to determine whether intelligence was revealed by these traits. Particu-

larly exhaustive measures were made of the head, its length, its width, and the relation between these two measures (called the cephalic index).

Physical and Motor Tests.—In the meantime there had been developing another variety of tests which may be called physical and motor. These were designed to call forth activity on the part of the back, forearm, upper arm, fingers, in fact, of almost all the muscles. Tests were devised which measured the strength that could be exerted by these muscles, the rapidity and accuracy with which they could move. The names of some of the instruments used are the ergograph, ergometer, tapping machine.

Sensory Tests.—Other attempts were made to measure intelligence through the medium of the senses, on the theory that perhaps the senses were the door to the mind, and their condition of fineness or coarseness might be an index of the quality of intelligence. Accordingly many tests were devised for the various senses; the æsthesiometer, to measure the delicacy with which two points could be discriminated on the skin; the audiometer, to measure how faint a sound could be heard; the colorimeter, to measure the sensitivity to color.

Tests for Higher Mental Processes.—Meanwhile experimental psychology was developing, and means were being evolved for the measurement of higher mental processes like imagining, memorizing, attending, and the like. In the glow of enthusiasm over these advances the hope was cherished that it might be possible to use one test as a reliable measure of the power to attend; another as a measure of power to memorize, etc.; and then to find one mental process that might stand as typical of intelligence. In spite of vigorous efforts expended in these directions the hopes have not been realized. It was reluctantly concluded that probably no single test can be used to measure any single mental process, and that no single mental process can stand as typical of such a complex thing as intelligence. One beneficial result accrued from such efforts, namely, the conviction that in order to measure intelligence, one must use many tests calling forth various kinds of mental activity. The way in which this may be accomplished will be illustrated presently. Meanwhile we

must note another phase in the development of tests for intelligence.

Tests Consisting of Practical Situations.—In the early part of the period during which intelligence tests were developing, the chief attention was given to the question, what does intelligence consist of? The question was never answered. No one was able to say: "It consists of so many units of this, so many of that." About 1905 a French psychologist, Alfred Binet, started another mode of attack. He conceived the plan of arranging a practical every-day situation (instead of an artificial piece of mental gymnastics) and asking the subject to adjust himself to it. He expressed the effectiveness of this adjustment in quantitative terms, and called this quantity a measure, or one of the components of a measure, of intelligence. In doing this he virtually reformulated the aim of intelligence tests as being not that of telling what intelligence *is*, but *what it does;* in which he made his task analogous to that of the physicist, who does not tell what electricity is as a static thing, but describes it as an activity in terms of its functions. It can furnish light and heat and energy in measurable units. A certain electrical current can drive a wheel with a mass of 30 pounds at a rate of 1000 revolutions a minute, exerting a force of, say, five pounds at its periphery. In much the same way Binet described the things which the various degrees of intelligence can accomplish. Thus one of the tests that was discovered to be appropriate for the intelligence of a child of nine years is to figure mentally how much change should be given if one made a purchase amounting to four cents and gave a dime in payment. Another is to name the months of the year. Since Binet showed the way, this principle has been extensively used in the manufacture of intelligence tests. The following are samples taken from some of the tests on the market which are intended for the measurement of adult intelligence:

"Underline the correct answer.

"A clock is related to time as a thermometer is to (?)

"1. a watch, 2. warm, 3. a bulb, 4. mercury, 5. temperature.

"Silver is more costly than iron because it is (?)

"1. heavier, 2. scarcer, 3, whiter, 4. harder, 5, prettier.

"One number is wrong in the following series. What should that number be?

"0 1 3 6 10 15 21 28 34" (8)

The Principle of Combinations of Tests.—In recognition of the fact that intelligence cannot be measured by any single test, psychologists began to use a number of tests similar to those described above, combining in one figure the scores made in the several tests and using the resulting net score as a measure of intelligence. This technique was employed until about 1915.

Invention of Test Booklets for Use with Groups of Persons.—About 1915 Walter Dill Scott printed in a single folder a number of the tests that had hitherto been given separately. This folder could be given to the subject with the instructions that he work until he should complete the tests or receive a signal to stop. It had the further advantage that it could be given to a large number of persons at once. This improvement led to the rapid utilization of tests for intelligence among large masses of people: school children, college students, soldiers in the army, and so forth. A number of test booklets have been placed on the market as a result of the evolution just described. Most of them are available for distribution through various publishing houses at prices ranging from about one cent to 25 cents a copy. They do not test intelligence with exactly the same degree of accuracy. An interesting comparison of several pairs revealed a likeness among them expressed by a coefficient of correlation of .83. (18)

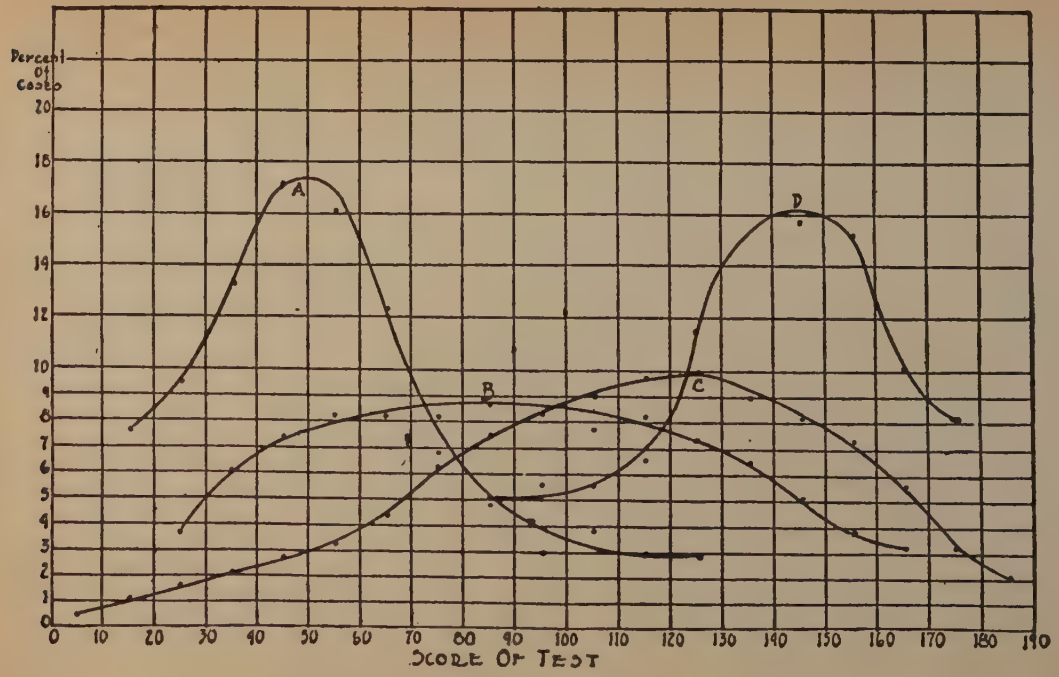
Accuracy of Measures of Intelligence.—Ever since attempts have been made to measure intelligence scientifically, objections have been made against intelligence tests: that a single test session is insufficient; that the subject may be physically below par; that he may be excited or nervous; that he may purposely fail to do his best, and so on. We cannot give separate refutations of all the objections. Elaborate studies have been made and reported in the technical literature of psychology which show the extent to which such criticisms are justified. The total result of such studies leaves us with the assurance that intelligence tests are reliable. True, they have a margin of error. All measurements do. If a physicist should measure the length of

an iron rod he would admit at once that his measurement would have a margin of error, amounting to perhaps 1/100mm. So a psychologist admits that his measurements of intelligence have a margin of error. And since psychology is a relatively new science, and since the measurement of intelligence involves so many more variables than the measurement of the length of a rod of iron, the psychologist acknowledges that his margin of error is relatively large, perhaps 10 per cent. Even with this margin, the fact remains that intelligence tests constitute the best means available of measuring intelligence, and so may confidently be employed.

Technique of Giving Tests.—At this point we might perhaps profitably pause long enough to illustrate many tests, to give full directions for giving them and scoring them. We shall omit such discussions, however. The testing of intelligence has entered so largely into modern life, and there are so many manuals devoted exclusively to the subject, that we shall merely refer to them in the bibliography. (19) We shall assume that what we say about tests will be understood to refer to cases where tests are used with due regard to their limitations, where the technique is properly administered, and where statistics are intelligently used.

Intelligence and Vocational Adjustment.—We are now ready to ask, What are the relations between intelligence and vocational adjustment and how may measures of intelligence be employed in facilitating the adjustment?

Intelligence and Vocational Analysis.—The first use is in connection with vocational analysis. Through the instrumentation of intelligence tests it is possible to measure the persons in a given vocation and determine the levels of intelligence required for various degrees of success. This is one item that should be included in the specifications for the vocation. (See Chapter Four.) It may be illustrated by results published by Miner. Four groups of salespeople were tested, one group consisting of the "lowest grade of salespeople behind the counters. They merely make change for purchases of articles picked off one-priced counters by the customers. A group of fifty-two of this type shows an average score on this test of 51. The range of



Types of Salespeople.

FIG. 10.

A. Counter salespeople.
B. Wholesale salesmen to local retail stores.
C. Insurance salesmen.
D. Salesmen requiring training at a technical college.

the middle half is from 36 to 70. The next better group of 73 salespeople were wholesale order takers who visited the local retail stores periodically to replace the stocks of a well-known brand of products. This group has an average of 89, distinctly higher than the other. Its middle half ranged from 59 to 121. It is clearly a different and higher type. Only about 14 per cent. of the counter clerks in the stores were above the average of this second group. The third group was made up of 326 insurance salesmen tested at their convention. It shows a clearly separate and higher mode. The average was 112 and the range of its middle half from 82 to 138. The highest of the four groups was again definitely separated and above the insurance salesman. It was composed of 66 salesmen who were selling a highly technical product. In addition to sales ability it required a complete technical college training. The last group of salesmen averaged 139 and its middle half ranged from 124 to 155. The significance of these occupationally selected sales types is that we can thus more definitely describe certain ranges of tested mental ability within which any salesman might find the group of competitors among whom his chances for occupational success are demonstrably greater." (7)

Intelligence and Vocational Selection.—While it is easy to see from these figures, graphically presented, that on the whole the intelligence required in one of these vocational groups is higher than that in others, it is not so easy to state exactly what degree of intelligence is required for success in each occupation. Shall one take the average? If that is accepted as the standard, we should be implying that the workers who fell below that point were undesirable. Perhaps they were, but we cannot assume that mere lack of intelligence as high as the average of a vocational group is a mark of vocational insufficiency. As a matter of fact, other abilities besides intelligence are required in sales work; some of the persons in the lower half of their group may have been satisfactory salespersons. The question more accurately stated is, What is the minimum level of intelligence that will be acceptable in a salesperson of any particular group?

Determine a Point of 'Acceptability.'—To answer this we shall first have to determine a point of vocational performance

that shall be required as a standard of 'acceptability.' That is, we shall have to say how much and what kind of work we shall exact of a worker who is to be regarded as acceptable. To accomplish this we shall first have to arrange the workers already engaged in the occupation in order of their efficiency. Certain units of accomplishment must be decided on, earnings, as illustrated in Table VII, page 56; output, as illustrated on page 18; or ratings by superiors. Then, the person who is doing the selecting will have to decide upon a point on this scale that shall mark the level of satisfactoriness. It might be the average, though it would not be likely to be so, for it is around this point that the great majority of workers cluster and it would not be possible to secure enough workers who are above the average. The point would more likely be around the twenty-fifth or the tenth percentile point. Thus, in Table VII, if the twenty-fifth percentile point were regarded as the limit of satisfactoriness, it would be represented by a salesman who could earn at least $3,373.96, if the tenth percentile point were used the corresponding figure would be $2,804.89. In actual practice, this percentile point of satisfactoriness will probably vary. In a firm where standards of production are very high it will be higher than in one where standards are lower. When workers are scarce the standard will drop lower than it will when they are plentiful.

Measure Intelligence of Workers.—After being ranked in efficiency in the manner described above, the workers must be measured with respect to intelligence. If intelligence is much of a factor in determining efficiency in the vocation, those who stand high in intelligence will stand high in efficiency; and those who stand low in the former will stand low in the latter. There will not be perfect correspondence, however, for, as was said before, intelligence is not the only factor that contributes to vocational success. The two series of rankings may correspond in about the same way as the two shown below, which are arranged by Scott and Clothier to show standings in vocational efficiency as judged by supervisors and standings in a test for general intelligence. (10)

TABLE XIX

Comparison between Standings in Vocational Efficiency and Standings in Intelligence

Employee	Rank in vocational efficiency	Score in the test	Rank in the test
A	2	67	1
B	3.5	63	2
C	5	61	3
D	6	59	4
E	7	54	5
F	1	52	6
G	14	50	7.5
H	9	50	7.5
I	3.5	48	9
J	12	47	10
K	15	46	11
L	18	43	12
M	8	41	13
N	16.5	40	14
O	10	37	15
P	13	36	16
Q	11	32	17
R	16.5	23	18
S	19	15	19

These figures show a fair, though not a perfect, correspondence. Of those who stand in the upper half according to vocational efficiency all but one stand in the upper half according to intelligence. Accordingly we should say that a new worker who could make a score of 48—the midpoint—in the test for intelligence would have a good chance of succeeding as well as the better half of those in the vocation, while one who stands below this point in the former respect would probably not make such a good worker.

We should not infer from this that we can use a measure of intelligence as a perfect index of vocational performance. We should not be justified, for example, in selecting the applicant who stands highest in intelligence in the belief that he will stand highest in the vocation, or in rejecting utterly all those in the bottom half. The practical question is, How far up the scale of intelligence shall we set the point of 'acceptability'? In other words, just as we found it necessary to determine a

point of 'acceptability' on the scale of vocational efficiency, so must we determine a point of 'acceptability' on the scale of intelligence. If the two series corresponded exactly, that is, if the one who stood first in vocational efficiency stood first in intelligence; and the one who stood second in the former stood second in the latter, and so on, our problem would be simple, since the points of 'acceptability' in the two series would coincide. But since the correspondence is rarely perfect, we shall have to employ some other method.

Pitfalls in the Use of Coefficients of Correlation.—In the effort to express satisfactorily the relation between standings in vocational efficiency and standings in intelligence, psychologists have usually employed the technique of correlation, which involves the expression of the relation in a single figure called the coefficient of correlation. Perfect positive correlation is represented by plus 1.00; perfect negative correlation by minus 1.00; and varying degrees of relationship by some number between 0.00 and 1.00. A correspondence indicated by .75 is generally considered high if it is four times its Probable Error. We cannot enter into an extended discussion of the theory or the methods of correlation. These matters are treated in a number of books devoted especially to them. [See, for example, Kelley. (5)] We shall pause long enough, however, to deplore the unwise use of the method of correlation that is frequently made in vocational psychology. Many cases are reported where a coefficient is called 'high' though it is only .50 or .60. Almost never are enough cases used to warrant reliance on a coefficient of correlation. The use of inappropriate formulas is also frequent.

One consideration of particular importance which has almost entirely escaped attention is that two series of measures may appear to correlate with a high coefficient of correlation and still the greatest amount of correspondence may be within certain sections of the two series. Confirming this point Ruml correlated by the usual method (product-moment) two series of measures; the coefficient was .43. He then treated the measures so as to find the degrees of correspondence at several points.

He found that they varied from .09 to .63. Thus it is seen a 'blanket' coefficient does not tell how close the two series are at their several points. And since in vocational selection, one is usually dealing with only portions of the scales of vocational efficiency and intelligence, one might be using a portion of these scales where the correlation was very low, and still one would think that it was high because the coefficient of correlation was high. (9)

A final limitation of the coefficient of correlation in the technique of vocational selection is that it gives no assistance to the personnel manager in deciding which one of several applicants he should select.

Probability-table More Serviceable.—The clearest way to express the relation between standings in vocational efficiency and standings in tests is the probability-table which was devised by the author from two series of measures reported by Thurstone, the vocational proficiency of 165 men who were learning to telegraph, and their standings in a psychological test. (This test is not classed as an intelligence test, but it will serve to illustrate the method of constructing a probability-table.) The men were first ranked according to their standing in telegraphy (speed of receiving); then they were ranked according to their standing in the psychological test. These standings were transformed by the author into percentile ranks. That is, the one who stood first in telegraphy was placed at the 100-percentile point, the one who ranked sixteenth was placed 10 percentile points lower (16 being one-tenth of 165), or at the 90-percentile point. Of course the one who ranked eighty-third stood midway between the highest and the lowest, *i.e.*, at the 50-percentile point. Ideally, 100 points should be established in this way in each series. Since there were only 165 persons, however, and the spread of scores was not very great, it seemed practicable to designate only the 20-percentile points, thus grouping the measures in quintiles. The quintiles were then superimposed on each other, the one vertically and the other horizontally in the form of a probability-table. Since one-fifth of 165 is 33, the

first quintile (from the top) extends down to the thirty-third case; the second extends to the sixty-sixth case, and so on. A count was made of the number of the workers who stood in the first quintile in test scores who were also in the first quintile of vocational efficiency, then of those who were in the second, third, fourth, and fifth quintiles. The numbers were respectively 20, 5, 4, 4, 0. These numbers were then transformed into per

TABLE XX

Probability-table Showing Correlation between Success in Rhythm Tests and in Receiving Telegraphic Words

Test scores Division by quintiles	Occupation scores Division by quintiles				
	1	2	3	4	5
1	60	22	18	0	0
2	14	29	30	14	13
3	13	27	30	23	7
4	13	8	10	30	39
5	0	14	12	33	41

cents. Twenty is 60 per cent. of 33; five is roughly 14 per cent. of 33; four is roughly 13 per cent. These are shown in the first vertical column of the table. (The actual per cents in this illustration should not be considered too binding, a slight shifting about of these values being occasioned by the effort to place in all the quintiles exactly the same number of cases horizontally and vertically.) Similar per cents were computed for all the quintiles and were arranged in appropriate divisions in the table. Such a table may be used in vocational selection as follows: Measure the intelligence of the applicant and determine which quintile his score lies in. Let us suppose it lies in the first (from the top). Reading from the table we can then conclude: The chances that he will be in the first quintile in vocational efficiency are 60 in 100; in the second, 22; in the third, 18; in the fourth, 0; and in the fifth, 0. One who stands in the lowest quintile in intelligence has no chance of standing in the first quintile of vocational success; 14 chances of standing in the second highest; 12 of standing in the third; 33 of standing in the fourth; and 41 of standing in the poorest.

Other Uses of the Probability-table.—This method is applicable not merely in the determination of vocational success from a measure of intelligence. It is suitable for use in showing the relationship between vocational standing and special abilities, education, physical measures, etc. And it should be used in these connections, for as has been repeatedly said, we can use intelligence as only one criterion in vocational selection.

Intelligence and Vocational Guidance.—When we come to use intelligence as a factor in vocational *guidance* we face a slightly different situation. Here we are not seeking an individual for a vocation but a vocation for an individual. The situation is complex because of the circumstance that vocation A might demand, say, 43 units of intelligence and so might vocations B, C, D, E, etc. The vocations of gardener, dairy hand, and teamster might demand exactly the same degrees of intelligence. Accordingly one who has this degree might, so far as his intelligence is concerned, be equally successful in any one of them. The vocations of surgeon, pianist, sculptor, and diplomat might likewise demand the same degree of intelligence. And one who has that degree might be equally successful in any one of them. Furthermore, one who has the degree of intelligence necessary for success in one of these complex fields is bound to have the degree demanded by the less complex vocations such as gardener and teamster (though he might not have certain non-intellectual aptitudes).

There is a further complication. Even though vocations differ slightly in the degree of intelligence required for the highest success, still a person possessing slightly less than the maximum amount might conceivably have a modicum of success in the vocation. He might, for example, succeed as well as do those in the lower half.

In other words, every normal individual has intelligence enough to enable him to attain a degree of success in dozens and perhaps hundreds of vocations. The only service that a measure of intelligence can render is to inform him whether or not he possesses the degree of intelligence demanded for a satisfactory degree of success in any given vocation in which he may be interested or for which he possesses other significant advantages; with

a further statement showing the probability that he may reach levels of vocational achievement above the 50 per cent. point, the 75 per cent. point, the 90 per cent. point and so on. Thus to a young man interested in chemistry advice might be given (after testing) as follows: Your intelligence should enable you to achieve a success as great as that of the 40 per cent. point of university professors of chemistry, or of the 60 per cent. point of analytical chemists. As a violinist, you might attain a mark equal to that of the lowest 10 per cent. of violinists.

Intelligence and Vocational Interest.—Although we may have appeared to consider vocational success as largely determined by intelligence, we insist that other factors must be considered, that they should be treated scientifically and with the technique of the probability-table similar to the one made for use with measures of intelligence. One of these non-intellectual factors is interest. It does not always follow that the degree of intelligence necessary for success in a certain vocation is accompanied by interest in it, and *vice versa*. Investigations on this point will be cited in a later chapter.

Reservations should also be held in mind regarding other non-intellectual determinants of vocational success, such as habits of industriousness, laziness, honesty, and the like.

Intelligence and Productiveness.—There is probably a positive relation between degree of intelligence and amount of output; that is, in the long run it is likely that the most productive persons in a vocation are more intelligent than the least productive. Unfortunately figures are not available to prove this point. One difficulty with the few figures that have been gathered is that productiveness has not been measured in terms of output but in terms of opinions expressed by supervisors. Even though we should like to use objective terms as measures of productiveness, we are unable to say what is the best measure to use, whether earnings, units of output, quality of goods. Investigations are greatly needed showing the relation between intelligence and these various measures of productiveness.

Intelligence and Turnover.—One of the most interesting relations between intelligence and vocational adjustment is revealed by a study of the length of time served on a job by per-

sons of varying degrees of intelligence. In Chapter Three we suggested that on certain jobs persons of low intelligence probably quit readily, recognizing that they do not have enough intelligence; similarly those with a degree of intelligence high above that demanded by the job quit readily since they do not find an adequate outlet for their superabundant intelligence. Thus Scott and Clothier found on a certain job that workers with an intelligence score of 40 were more likely to stay on the job than were workers with intelligence scores of 60 or 20. In another job the workers who had an intelligence score of 70 were the most stable (10). Accordingly we see that it is important to discover the level of intelligence demanded on each job so as to keep labor turnover at a minimum.

Intelligence Tests Must Justify Themselves Practically.—Before closing this discussion we should acknowledge that the use of measures of intelligence in actual vocational adjustment must be determined partly by practical considerations. In the employment of unskilled workers it may not be worth while to make fine discriminations between workers. There are only a few applicants of high intelligence among them, and their superior intelligence can usually be detected without the use of scientific tests. In the case of vocations of greater and greater complexity, however, intelligence probably becomes an increasingly important factor; and an exact determination of the level of intelligence of the individual is necessary. For a reliable determination of the point at which intelligence tests will practically justify themselves, investigation is necessary.

Summary.—In this chapter we have considered the relations between intelligence and vocational adjustment. We have defined intelligence according to the best light available; we have tried to find its physical basis; we have presented a brief historical survey of the attempts that have been made to measure it; and have surveyed the best current practices. We have shown how intelligence affects vocational adjustment in relation to vocational selection, vocational guidance, output, length of service, interest, and other psychological factors. Finally, we have

recommended that a common-sense attitude should attend the measurement of intelligence in business and industry, and that its exact value be determined by trial.

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CHAPTER VII

SPECIAL APTITUDES AND ABILITIES

Grounds for Belief in Special Innate Vocational Abilities.—Though general intelligence is acknowledged to be an important requirement in many vocations, it has seemed that for success in certain vocations various other psychical traits are necessary. For example, though two persons may have the same amount of general intelligence, one can become a high-grade telegrapher while the other cannot progress so well. Some persons seem to have special bents for mechanics, music, drawing, while others equally intelligent are very inept in these fields. Such cases occur so frequently that the belief has arisen that there exist special innate aptitudes which are conducive to success in certain occupations and which can be tested and measured. (A distinction is sometimes made between aptitudes and abilities; the former term being applied to abilities that are inborn—sometimes called capacities; the latter term being applied to traits that must be acquired. We shall try to observe this distinction in our discussion.)

On the strength of the belief in innate vocational capacities attempts were made by Münsterberg (about 1913) to devise a series of tests that would isolate the alleged special aptitudes required in several vocations—telephone operating, street-car driving, and navigation. His experiments as reported do not show satisfactory adherence to the scientific method laid down in Chapter One of this book, hence his conclusions are ill-founded. Nevertheless he wrote so enthusiastically about the possibility of testing for vocational aptitudes that he was copied by a number of other investigators, until today there are scores of vocations for which tests have been devised. In the case of railroad and steamship work there are obviously special inborn traits that must be present, for example, visual acuity and discrimination of colors, which will enable workers to perceive and interpret signals properly. Tests for these two traits have long

been used. It should be noted, however, that these capacities are physical, or at least, physiological, located in the mechanism of the eye. Similarly, many of the capacities involved in musical talent may have a physiological basis in the native apparatus of the ear. It is likewise possible that the ability to tap rapidly and accurately in occupations like typewriting and telegraphy is determined by innate physical factors such as the flexibility of muscles, tendons, and joints.

But it is alleged that there are in addition certain innate special *psychical* aptitudes that fit a person for one vocation rather than another, and that they are measurable by psychological tests. Before embarking upon a discussion of these tests, it is fitting to question the propriety of holding to this opinion. If these psychical aptitudes really exist they must have some basis in the neurones constituting the brain. Now though the science of neurology does not emphatically deny that there are qualitative differences in brain cells which would make one person adept at numbers and another stupid, one person clever at drawing and another awkward, still it does bring evidence that such a condition is very unlikely. It teaches that neurones in one brain are not differentiated according to their readiness to respond to such complex stimuli as a book-keeper's ledger or a draughtsman's table, and it recommends that we examine very critically the idea of special innate psychical capacities and weigh very cautiously the vigorous and optimistic efforts being made to find them and isolate them.

'Analytic' Aptitude Tests.—We may describe the efforts made to test vocational aptitudes by classifying the various methods of procedure. One consists in observing the work of a vocation with more or less minuteness and concluding that it demands certain 'elementary' processes, then, in giving to workers in the vocation a number of tests calling forth these activities and regarding these tests as tests for the vocational aptitude.

For example, Münsterberg observed a telephone operator at work and noted that she was obliged to remember numbers. A well-known psychological test that had been used in an attempt to measure memory for numbers is to present a series of numbers

like these: one series of five, 29384; a series of six, 649327; one of seven and so on to ten. The subject is given these orally, and then is asked to repeat them exactly. This test Münsterberg used and called a test for telephone operating. Aside from the fact that there is no test that will serve as a test for memory for numbers in general there is a question whether memory for a *long* series of numbers is really one of the salient abilities required in telephone operating, which requires the retention of only four digits at most. The ability to retain 10 digits is not called for.

Even if an investigator fortunately escapes committing such an error he is likely to encounter other dangers in endeavoring to use the analytic method of preparing occupational tests. For one thing, even with the most assiduous care it is impossible to analyze out all the components of the ability concerned. This is probably not fatal to the method, but it should be reckoned with. Again, even if the capacities were all analyzed out, they would not stand in their separateness as duplicates of the complex unitary ability in actual life. Again, it is difficult to detach these capacities from each other. They are so closely wrapped up in each other that even when one is found, it will have involved in it one or more others. Then comes the question, How much weight shall be attached to each of the analyzed components? Are they all equal or is one twice or three times as important as another? Perhaps the greatest difficulty involved in the devising of analytic tests is the mere bulk of work involved. An idea of this may be secured from the experience of Seashore, who, with his assistants at the University of Iowa, has worked on the analysis of musical talent for thirty years, and though he has made most satisfactory progress, he still acknowledges that his analysis is incomplete. Analysis by these same careful methods of the 3000 occupations mentioned in the United States Census accordingly looms gigantic.

Analogous Tests.—In the face of all these difficulties, some investigators have frankly abandoned the aim of analyzing vocations into their components. They have instead tried to devise tests that are merely analogous to the operations being considered. Thus Link, in seeking to devise a test that would dis-

criminate between persons who were capable of operating hand-fed dial machines rapidly and those who could not, used an instrument described as follows: "On the top of the graphophone dial was placed a round, sheet-metal disk, large enough so that it projected considerably over the edge of the motor box. Near the edge of the disk were cut two slots eight inches long and an inch and a half wide. These slots were fitted with slides which made it possible to regulate the size of the opening. Under this disk, and attached to the motor box in such a position as to be directly under the slots in the revolving disk, was placed a funnel. At the neck of this funnel a Veeder counter was attached in such a way that a one-inch steel ball dropped through the funnel would cause it to register. The object of the test was to revolve the sheet-metal disk so that the slots in its border passed over the mouth of the funnel at a certain number of revolutions per minute. As the slot passed over the funnel, the operator, or person being tested, was to drop the steel ball so that it would fall through the slot and into the funnel below it, where it would be registered. If the ball were dropped on the disk or at one side of the opening, it would naturally fail to register." (6)

Vocational Miniature.—Approximating more closely the actual work of an occupation is a form of test that has been called 'vocational miniature.' This presents for the performance of the subject an actual bit of the vocation. Münsterberg proposed such a test for the measurement of aptitude for telephone operating; he devised a pointed plug which should be inserted quickly and accurately into a hole as the plug of a telephone switchboard must be inserted. He equipped the mechanism in such a way that errors were recorded by means of an electrical attachment. Now, whether this apparatus tests a part of the activity required in telephone operating, no one can say for certain. One can only say that the test measures the ability to insert the particular plugs used into the particular set of holes used. As a matter of fact, the particular ability thus tested (if it is a particular ability) may not be required at all in telephone operating.

In some cases a test of actual work is used. This is not a

test of aptitude, but of acquired ability. In the case of a vocation in which a particular and difficult skill must be acquired, such a type of test can hardly assist in selecting workers since, without experience in the vocation, the candidates would not have opportunity to acquire the skill necessary for succeeding in the test. On the other hand, if the particular skill demanded in the vocation is so slight that one can perform it without experience it would hardly be worth while to take the pains to test applicants since an error of placement would not be very serious.

Empiric Tests.—A type of test that is used more frequently than any other may be designated, following Hollingworth, an empiric test. (4) Without trying to analyze or to provide analogous situations, some investigators have said, "Let us take a group of tests of any sort, apply them to a group of workers whose occupational ability we have measured, and correlate the measures of their performance in the tests with the measures of their success in the occupation. Those tests showing a high degree of correlation between these two series of measures will be considered as suitable vocational tests." This method of devising a test relies mostly on chance. The reliability of a test comes to depend on a coefficient of correlation. It is usually asserted by the advocates of this method that tests which show a high correlation between test scores and vocational success involve mental processes identical with those involved in the vocations. As a matter of fact there is no assurance that the psychic processes are the same.

There are other objections to the use of the empiric method of devising tests. It is so easy to apply that it is often used without regard for the technique of scientific method laid down in Chapter One. It is applied to vocational groups of from 20 to 50 instead of the hundreds really required in order that the statistics shall be reliable. Again, whereas the statistics of correlation require a coefficient of correlation around .75 and four times its probable error, a coefficient of .50 or .60 is sometimes called high, with complete neglect of the probable error.

In the present primitive stage of vocational psychology it would seem that these methods of making tests are too precarious, and that the best and most certain method to use—imperfect at

best—is that based on an analytic study of vocations. The methodology and the value of this will now be pointed out.

Measurement of Musical Capacities.—As an example of true analytic method may be recommended the technique employed by Seashore in analyzing musical talent. This investigator proceeded on the assumption that musical talent is composed of a number of capacities, perhaps abilities as well. Five large groups are discerned, with more elementary sub-classes, as follows:

Musical Sensitivity.—One who has musical talent must have a delicate sensitivity for the elements of musical stimulation. He must be able to distinguish between two tones that differ only slightly in pitch, and between two tones that differ only slightly in intensity or loudness. He must be able to judge accurately concerning intervals of time. Still more complex abilities required are the capacities to distinguish between the qualities of tones made by different instruments and voices, to keep rhythm, and to judge concerning consonance and dissonance.

Musical Action.—If one is to be a performer, he must possess the ability to control the parts of the body used in playing or singing. Control must be present over pitch, intensity, time, timbre, rhythm, and volume. As may be readily seen, a high degree of sensitiveness to the pitch of tones may be present without the ability to control the pitch of a tone which one is producing.

Musical Memory and Imagination.—Musical ability requires the power to hold in mind a number of tones combined serially; to image sounds with considerable freedom; and to put them together in new combinations; the ability to image movements (those necessary in musical performance); and finally, the ability to learn new things in music.

Musical Intellect.—Among the intellectual activities involved is one that Seashore calls 'musical free association,' the tendency for musical sounds to call up in the mind rich associations. 'Musical power of reflection' is also listed; and finally, general intelligence. To be really adept in music, either as listener or performer, requires a high degree of general intelligence, a trait discussed at length in Chapter Six.

Musical Feeling.—This is one of the most interesting of musical capacities. As may be surmised, it refers to the capacity to receive emotional stirrings and thrills from musical stimulations. The forms that these feelings take are (1) musical taste—likes and dislikes; (2) emotional reaction to music; (3) emotional self-expression in music.

Physical Basis of Inherited Vocational Capacities.—The second of these is one of the most interesting of the activities here discussed. It may probably be regarded as an example of a special vocational capacity that is inherited. In answer to the question, What is the inherited physical basis for this? a physiologist would probably reply that it is in the autonomic nervous system. This consists of several segments of the nervous system which, while connected with the central nervous system (brain and spinal cord), are capable of working by themselves with considerable freedom. One segment, located near the heart, serves as the mechanism for the acceleration or retardation of the heart-beat, which may occur at time of musical enjoyment. Other segments control the lungs, the viscera, and other involuntary organs of the body which move involuntarily. Now, in an individual who is profoundly moved by musical stimulations, these autonomic centres are probably highly permeable to the nervous energy that is diffusing itself all over the nervous system. Within an individual who is cold to music, however, these autonomic pathways may be less permeable.

The analysis made by Seashore offers room for interesting speculation regarding the nature and distribution of special vocational aptitudes, particularly regarding the possibility of their inheritance. Four of the Seashore tests were given to 85 members of six families well known in the musical life of America. Facts were secured which give grounds for believing that musical capacities are inherited. (11) This must not be interpreted, however, as implying that the ability to play the piano is inherited as a specific thing. To draw this conclusion from these data would surely be unwarranted. There is no evidence showing the inheritance of any *complex* musical ability such as playing the piano, the violin, or the harp. If such complex abilities could be inherited, it would not be necessary for players to

take lessons; they could play without tutelage. As a matter of fact, one who desires to play a musical instrument of any difficulty at all is obliged to undergo arduous hours and years of study and practice endeavoring to acquire the necessary skill. No, the capacities that have been discussed here are not ready-made vocational abilities. They are only elementary capacities, many of which may be used in vocations other than music. For example,

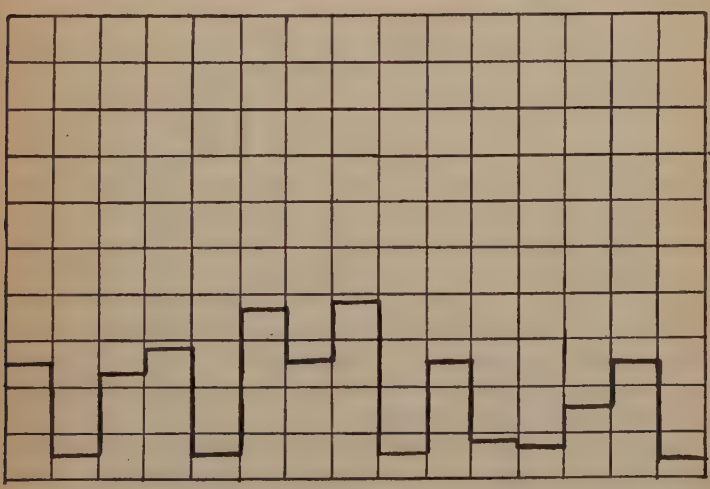

FIG. 11.

Showing musical 'psycograph' of Mr. White, from Seashore's *Psychology of Musical Talent*. Published by kind permission of Silver, Burdett & Company, Publishers.

sensitivity to rhythm may be used in either the field of piano playing or that of dancing; a high degree of sensitivity to pitch may be employed in violin playing or in piano tuning. Instead of saying that Paganini, for example, was 'cut out' for a violinist we should admit that he probably would have been equally able as a pianist if he had coördinated his native capacities, through practice, in the direction of piano playing.

These elementary capacities are inherited in different degrees within the same individual. One person may possess in high degree the power to discriminate between two tones that vary only one-fourth of a double vibration per second, and still possess in only a moderate degree the ability called 'musical memory,'

that is, the ability to reproduce several tones sounded consecutively. Probably one who is exceedingly high in several of these elementary capacities is likely to be very high in others, and one who is exceedingly low in several is likely to be low in others, but in the middle ranges there are considerable variations within the same individual. This will be shown in a sample psychograph showing the distribution of musical abilities within one subject:

"Mr. White's sense of pitch is superior; his sense of intensity is good; his sense of time is excellent. His sense of consonance is superior. His acuity of hearing is also superior. He has good tonal imagery and superior tonal memory. His general motility, timed action, and rhythmic action are quite good. He has superior capacity for singing in pitch, sings intervals well, and has good voice control for pitch. He has a superior register and good quality of voice.

"In general, Mr. White has an unusually strong and well-balanced musical mind, ranking in this respect within the best three per cent. in a normal community. He has always manifested great interest and activity in music but has had only a small amount of formal training. He lives in a tonal world and is emotionally responsive to music." (10)

Not Musical Ability but Musical Abilities.—As a result of his investigations, Seashore concludes that one should not speak of musical ability as a single unitary trait, but of musical *abilities* (or capacities). Some, such as sensitivity to pitch, rhythm, intensity, and the like, are probably inherited; others should, perhaps, be spoken of as habits; whatever their classification, they consist of such things as industriousness, general intelligence, etc. Practically all the traits in superlative degree are required before one can be a truly great musician. Lesser musicians may have some but they do not have all.

In this discussion we have tried to show that the discovery and measurement of special vocational aptitudes are not so easy as is popularly imagined. Though numerous tests have been proposed as easy devices for detecting supposedly simple vocational aptitudes, they have not yet demonstrated their power to do so. In contradiction to this statement the reader may point

to certain tests such as those listed in the Appendix, and cite coefficients of correlation which show that success in these tests is apparently related to vocational success. In addition to the cautions which we urged regarding the acceptance of such statistical data, we might make another suggestion. If these 'aptitude' tests are examined they will be found for the most part to consist of the same kinds of tests as are used for the measurement of general intelligence. It is quite likely, then, that whatever success they have in indicating persons with high vocational ability is due to the fact that they show merely which persons are of high intelligence. If this is so, they are, after all, tests of general ability and not special ability.

Development of Trade Tests.—Whether or not we believe in the existence of innate vocational aptitudes, we must readily admit that there are a large number of elements in vocational adjustment that must be learned. In carpentry, for example, regardless of how well a man's hand fits natively around the handle of a hammer, he must learn how to make a mitre joint. And just as we discovered that there are great differences in the native intelligence of people, so we find that there are great differences in the degrees of skill that various workers have acquired. A scientific régime of vocational adjustment demands that the amount of skill possessed by a worker be measured. The devices that are used for such measurement are known as trade tests. (Though this term is usually applied only to tests in the technical trades like blacksmithing, carpentry, and the like, we shall use it in a broad sense to mean tests for learned vocational abilities of any kind.) In a sense, tests of vocational proficiency have long been used in vocational adjustment. Persons who employ stenographers have long been accustomed to dictate a test-letter to a person applying for a position. If the letter is written with the degree of speed and accuracy demanded by the employer, and if other conditions are favorable, the applicant is hired. Likewise a director of a musical show requests a girl to dance and sing before he engages her. Such tests, while they have been useful, are for the most part only rough and unscientific: they are not applied in exactly the same way

time after time; the results are not stated in quantitative terms; and they do not give an accurate measure of the ability of the worker. They constituted the sole instrument for the measurement of vocational skill, however, until the advent of the World War. At that time there was special need of some method by which vocational ability might be measured. The work of the army on the front required skilled workers in many civilian vocations: horseshoers, chauffeurs, electricians, and the like, and in order that the precious steamship space might not be occupied by men who would later be found to be incompetent, it was desired to test the alleged specialists before permitting them to sail. Accordingly psychologists and representatives of the trades were called into consultation and asked to devise tests. They did so on behalf of about eighty trades, establishing a technique that has been found applicable in civilian as well as military situations.

Three Forms of Trade Tests.—The tests devised were of three forms: question tests, performance tests, and picture tests. The first consisted of a number of questions that could be put to a candidate orally and thus could show in about fifteen minutes whether or not it would be worth while to test his ability further. The questions were not exhaustive but they were searching, being so worded that one could not answer them without having had experience in the trade. For example, a carpenter might be asked:

"What portion of the length of a 16-inch shingle should be exposed to the weather on a roof? What is a fire cut, and why is it used? What is the usual size of a 2" x 4" after it has been sized on one side and one edge?"

An interesting variation on the question test is proposed by Waldo, who formulates a number of questions calling for facts about a given machine. Blanks are left in each question and the applicant is asked to supply the missing words. The 'missing word' test used for the Gridley Multiple Spindle Automatic Screw Machine is as follows:

1. "The turret tool slide is mounted upon the————————
Answer: spindle carrier.

2. This permits the machine to operate under———— loads and————feeds.
   Answer: (1) heavier; (2) coarse.
3. The————gears are in front of the machine at the right.
   Answer: speed change.
4. Stock is fed in the————position.
   Answer: fourth.
5. By using a————tool-holder heavy forming may be accomplished in second position.
   Answer: double deck." (12)

The performance test might require the applicant to perform some such process as this: "Take this three-foot piece of 1 x 6 and surface four sides with a hand plane to a final dimension of ¾ x 5¾. Take these two-foot pieces of 2 x 4 and make a butt joint at an angle of 45 degrees." Measures are taken of the time required to do the work, and note is made of the quality of work done.

The picture test requires the applicant to read and interpret a blue print or a diagram. Or it might require him to name the parts of a machine.

Procedure in Scientifically Devising a Trade Test.—If one wishes to use trade tests in industry, one will have to make tests. There is a rather rigid technique required if a test is to have scientific validity.

Who Should Make a Trade Test?—Preferably a psychologist should be employed. With him should be associated an expert workman and perhaps an efficiency engineer. The psychologist should furnish the scientific method; the workman, the technical knowledge of the operations; the efficiency engineer, or foreman, or superintendent, the practical knowledge of the organization and the changes that will be required in installing the test. Perhaps the personnel manager might profitably partake. It may happen that he will have had sufficient psychological training so that he can dispense with the services of a professional psychologist.

Preliminary Analysis.—Before starting to make a trade test one should analyze the trade according to the principles laid down in Chapter Four. Theoretically this analysis should be complete, but since such an aim is impracticable we can only stipulate that there should be some analysis. It may be only so superficial as watching the worker closely, setting down on paper the names of his operations in sequence, and asking him what are some of the facts that must be known before he can perform the duties of his job.

Tentative Formulation of Questions or Tasks.—Let us assume that we are preparing a question test. One must write out a long list of questions relating to the job, questions that only a good worker can answer. These will be elicited from the worker, who is taken into consultation, though the warning should be given that they will come only with great difficulty. For no matter how expert the worker may be and how willing he may be to coöperate, he does not usually take the initiative in analyzing or in formulating questions as a result of the analysis.

Try Out the Preliminary Questions.—After a series of questions are prepared, one should select a number of workers and ask them the prepared questions. Note should be taken of any difficulties they experience, especially of any respects in which the questions are not clear. Special attention should be paid to those questions that elicit varying answers. Then the preliminary questions should be revised. Those that are not clear should be reworded; those that elicit several answers should be rephrased; those that duplicate others should be eliminated. After such a process of refinement, the tests will shrink in number to perhaps twenty. They are now ready to be 'standardized.'

Standardization.—This is a process of giving the questions to a number of workers of various levels of proficiency; as at first recommended, four—expert, journeyman, apprentice, and novice (one who has had no experience in the trade). The recommendation has since been made that three levels of proficiency are sufficient—journeyman, apprentice, novice. If the test is a good one a journeyman should answer the majority of the questions perfectly; an apprentice a smaller part; and a novice practically none. (2) The test should be given to a number of workers

of each of these classifications—twenty of each class—in order to see that it is a good one. Any questions that remain beyond the percentage mentioned above should be eliminated. By this time the test is said to be 'standardized.' It is now ready to be used seriously.

Testing an Applicant.—The test is administered to an applicant and according as he answers the questions one decides whether he has the trade ability of a novice, an apprentice, or a journeyman.

The technique of the trade test is applicable to professions as well as trades: to salesmanship, authorship, business correspondence, surgery, violin playing, and the like. Of course, it is not yet scientifically applied in these professional fields, though some churches may be said to use an unscientific application of the principle when they are hiring a preacher for their pulpit or a soloist for their choir. In spite of its wide applicability, however, there is surprisingly little use made of the trade test in industry, even in the trades where it is most easily applicable. The reasons for this neglect probably are that the executives who might apply it do not know of its existence; or they have no one competent to make and use tests; or they do not want to take the trouble; or they are afraid to make a new departure. It must be recognized that there are probably certain situations where the use of trade tests is not justified. In a vocation where there are few workers to be had, for example, an employer is obliged to take what he can get and so he may not be able to make effective use of a trade test.

Uses to Which the Results of Trade Tests May be Put.—In situations where they can be profitably employed, the benefits of trade tests may be listed as follows: Besides facilitating the selection of workers who have the desired degree of vocational ability, they may serve as measuring scales on which might be measured the efficiency of workers already at work. They may serve as one of the bases for promotion. In a vocational school they may be used to reveal in standard terms the progress being made by each learner, in which case they correspond to the position held by achievement tests that are used in the public schools

for the measurement of the progress of pupils in learning to add, spell, and write. (7)

Watson has suggested how certain valuable features of the trade test may be incorporated by an employer without disarranging the routine of his methods of employment. He recommends that the test be used not as a separate test to be taken by the applicant with fear and trembling, but as a part of the regular interview during which the applicant is being considered for the position. It is expected that the employer will ask questions. The essential thing to do in making an adaptation of trade test technique is simply to standardize the questions, that is, carefully to formulate questions that will reveal the extent of a worker's knowledge about the trade and give these to every applicant in exactly the same way. In the case of a machinist, the applicant is often asked, "Can you use a micrometer?" "His answer to that question must be either 'yes' or 'no' and is of no value in estimating his trade skill. However, if the answer to that question should be 'yes' and if it were followed with the question: 'How many turns of the barrel of a micrometer equal one-tenth of an inch?' the response would be a very definite check upon whether or not the man was familiar with the use of the micrometer. If he is an engineer and says he knows how to set slope stakes for road construction he might be asked this question, and others like it: 'How far from the centre line of a 16-foot railroad fill do you set the slope stake for a 5-foot fill with a one to one slope?' All of these questions can be answered by not more than two words. If in the course of the interview ten such questions are used and they are all answered correctly, you can be sure the man knows his trade.

"It would seem, therefore, that the logical method of introducing the trade test principles into industry today is as a part of the interview and not as a separate test. A test which would give a percentage rating would be of considerable value, but it has been found that almost as accurate results can be given by using a number of standardized trade questions during the interview as a check upon the experience statement of the applicant. When a standardized interview is based upon the job analysis and a personnel description, it is comparatively simple to pick

out those essential points of information which should be covered by a trade question.

"This question would largely eliminate the objection on the part of the applicant to being examined in a formal way and would at the same time make it impossible for a man to 'bluff' on his previous experience. Although the questions may involve information which seems very simple to the mechanic, it has been found that unless a person is actually engaged in that particular work he will have no occasion to acquire the language or knowledge involved in a trade question.

"An objection might be raised by the employment man that any question which calls for a name or trade term is not a measurement of trade skill. Experience has shown that trade language and the knowledge of terms and measurements required in actual operation are highly correlated with trade ability, and unless a man is actually an experienced workman he does not acquire the information which is used as the basis of a good trade question. Experiments have been conducted a number of times and it has been found that a man who is highly skilled in one branch of mechanical work and can answer any question asked him about his trade would be unable to answer a single question on another trade of mechanical skill. It was the discovery of this high correlation between trade language and trade skill which led to the use of the form of question found so successful in the army." (13)

Summary.—In this chapter we have discussed the possibility that there may be special aptitudes distinct from general ability, inquiring especially whether aptitude for any particular vocation is inborn. We acknowledged that there might be certain native physical traits which might aid or handicap one in certain vocations. Can we acknowledge with equal freedom that there are innate psychical vocational aptitudes? The evidence was inconclusive either way, but the view was proposed that whatever aptitudes are inborn must have a physical basis. This basis must be in the nervous system. According to our present knowledge of neurology we can hardly imagine the inheritance of ready-made vocational abilities in terms of the nervous system. The chief arguments may be recapitulated as

follows: so far as is known, nervous tissue is nervous tissue, that is, there is not, probably, one kind that lends itself to adjustment in a manual occupation like street-car driving, and another that lends itself to a so-called 'mental occupation' like accounting. We acknowledged that such differences in adaptability do exist, but we proposed that they be accounted for, not on the ground of innateness, but in one or both of these two ways: there might be some physical non-neural impediment to certain types of adjustment. For example, a person of the 'intellectual' type, who adjusted himself excellently to the vocation of lawyer, might be awkward as a dancer because certain joints necessary in dancing might not articulate well; or his muscles might not have the requisite tonicity, or his heart sufficient recuperative power. Any of these might be innate and still not have any pronounced bearing on successful vocational adjustment.

The second way of accounting for the seeming presence of special abilities is that special adaptability or special inadaptability may be the result of early experiences involving strong associations which would cause faulty adjustment. When emotionally colored, these may arouse or dampen one's interest and when merely associated without strong emotional flavor they may still have a powerful effect.

Finally, one reason why persons do not display equal ability in all lines is the common-sense one that to become really expert in one line requires long practice and stern concentration. There are only twenty-four hours in the day, and if one devotes a great part of them to acquiring perfection in one line he does not have time to develop equal facility in another line.

In spite of all this disbelief in the presence of 'psychical,' 'spiritistic' aptitudes for special vocations, we must acknowledge the possibility of vocational aptitudes for which certain physical definitive powers or limitations exist. One of the best illustrations of this was furnished in the case of aptitude for music. It was pointed out that musical aptitude should not be spoken of in the singular as though a person were either entirely musical or entirely non-musical. The traits that enter into the situation are numerous and various. In the first place, there are three groups of people who may be said to be

musical: (1) those who have capacity for performing, (2) those who have only capacity for enjoyment, and (3) those who have capacity for enjoyment coupled with capacity for performing. In the first case there are sensory capacities (some of which were specified) and also motor capacities, such as ability to move quickly, ability for the joints to articulate. These latter are probably present in case (1) and absent or deficient in case (2). Even among these classes there should be differentiated other abilities. They were named, following Seashore, the power to respond emotionally, intelligence, imaginativeness, etc. Accordingly, we should not speak of musical ability but of musical abilities.

The possibility that at least some of the musical abilities are innate was readily admitted. They may be thought of as having definite physical basis; they can be measured; and their favorable or unfavorable influence upon one's degree of musical talent may be determined.

The idea was set forth that the technique employed in analyzing musical talent may be applied in many other vocational fields. By means of it, light may be secured on the aptitudes that may be considered as innate and those which should be considered as acquired. The whole question is, however, very complex and requires a vast amount of investigation by serious-minded scientists. Awaiting this, the layman is advised to be chary about believing in innate vocational aptitudes. It is probably safest to hold tentatively to the belief that every person of average general ability possesses multitudes of special capacities and can develop many other abilities. All of these with their many possible combinations may help him to adjust himself in a large number of vocations.

As for special acquired abilities, we readily acknowledged their existence and their practical importance. We outlined a method of measuring them scientifically, through the technique of trade tests. These, we showed, though not extensively employed, might serve a number of desired ends in practical vocational adjustment.

For the benefit of readers who desire to examine the attempts that are being made to secure tests for vocational aptitudes, a

list is given in the Appendix. This is not complete, but it is representative of the wide scope of the inquiries being conducted and is illustrative of the technique most frequently employed.

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CHAPTER VIII

INTEREST AS A FACTOR IN VOCATIONAL ADJUSTMENT

Importance of Interest.—It is generally agreed that one of the important factors in vocational adjustment is interest. Unsuccessful persons frequently give as the reason for their failure: "I am not interested in my work." And they assert that they cannot become interested in it. Whether this assertion is well founded or not is open to question. There is no question, however, that to develop an interest in certain vocations would be extremely difficult for some persons, particularly after reaching middle life. On the other hand, one of the most conspicuous signs marking the person who is eminently successful in his vocation is an absorbing interest in it. Furthermore, there are many cases of persons who have become deeply interested in vocations in which they previously had no interest. Whatever its source, everything seems to point to interest as one of the important components of successful vocational adjustment.

Interest not a 'Thing' but an Activity.—Interest is usually spoken of as a thing, as an entity, which resides within an individual, having been there from birth. The task of vocational adjustment is considered to be that of examining an individual in order to discover his interests, and then to guide him into an appropriate vocation. Vigorous efforts have been expended in order to 'discover' interests. We have already discussed interest to some extent and have concluded that interests in vocations, at least, are largely generated by experience. We shall now show that interests should not be regarded as mysterious forces residing within one, which are fixed once and for all at birth. They are *activities* of the individual, conforming in many respects to habitual acts. Since they are spoken of in these active terms, therefore, we shall try to avoid the use of the noun 'interest,' and shall use, wherever possible, the verb form 'to be interested,' defining it in common-sense terms as follows: To be interested

in a thing is to endeavor to identify one's self with it. After presenting arguments to support this conception we shall review the efforts that have been made and are being made in the direction of a scientific investigation of interest in vocations. The grounds for insistence on a dynamic, rather than a static, conception of interest are as follows:

One may be Interested in Several Vocations.—An individual may be interested in a number of things that might have vocational significance. Benvenuto Cellini was equally interested in gold and silver smithing, in metallurgy, and in sculpturing in marble. Benjamin Franklin was interested in printing, electricity, government, and politics. A talk with the average senior in college shows that he is interested in several fields. From what he has learned of banking he may be interested in it. From what he has learned in geology he may be interested in mining engineering. Meanwhile, he may also be interested in playing the violin. Under such circumstances, the task of choosing a vocation on the basis of interest is very complex.

Interests may be of Equal Strength.—What is still more perplexing about such a situation is that one of these interests may be no stronger than the other. So far as their 'victim' can distinguish, they are of equal strength. Still more difficult is the problem when one is interested in several fields that are not easily related. In such cases it may be possible to make a compromise, that is, to choose a vocation in which the interests and desires of diverse sorts can focus and have an outlet, each one supplementing the other. As an example might be cited a hypothetical case. Suppose a young man is interested in artistic things. At the same time he is interested in outdoor life; cannot endure being penned in a studio, or an office; and is interested in business. He might conceivably be successful as an artist, a farmer, or a banker; but if he entered any one of these vocations he would probably be obliged to stifle the other interests. Under such circumstances it is not absolutely necessary that the individual gratify but one of his interests. He might relate those which seem to be not easily related. He might, for example, decide to become a landscape gardener, in which vocation he could gratify at the same time his esthetic tastes, his need for an

outdoor life, and his predilections for business. It is probable that most successful vocational choices are matters of such compromise.

Interest is not Always Conjoined with Ability.—A real tragedy occurs when interest in a field is intense, but is not accompanied by ability commensurate with it. The ability that is lacking may be simply general intelligence; or it may be some particularly essential special ability, such as the capacity of making fine discriminations in pitch which a vocalist must have. A singer may be ever so deeply interested in singing, but if he is deficient in this respect he will flat or sharp, and thus be greatly handicapped in a musical career.

Some attempts have been made to determine in quantitative terms the degree to which interests and abilities are conjoined in the population at large. Thorndike examined a number of university students, asking them to rank certain school subjects (first, according to the interest they had in them; second, according to the ability they displayed). He then correlated the series of figures representing interest with the series representing ability, and discovered a correlation coefficient between interest in later elementary school and ability in college of .60 in one study and .66 in another; and between the order of abilities and the order of interests in later elementary school, high school, or later college of .89. He concludes: "A person's interests in the late elementary school period resemble, in their order and relative strength, the constitution of interests which he will have eight years later to the extent of six-tenths of perfect resemblance. The correlation between an individual's order of subjects for interest and his order for ability is. . . . one of the closest of any that are known. . . . On the whole the resemblance between interest and ability may safely be placed at about .9 of perfect resemblance. Interests are. . . . shown to be symptomatic, to a very great extent, of present and future capacity or ability. . . Interest and ability are bound very closely together. The bond is so close that either may be used as a symptom for the other almost as well as for itself." (23)

Several objections to drawing these conclusions from these figures have been made. One is that the subjects examined were

asked to depend upon their memory of their degree of interest and ability during their elementary school period, which gives room for fallacies. Another objection is that the interests dealt with were very likely immature. In cases where the interest was lacking it might, with greater maturity, develop.

Bridges and Dollinger, investigating the relation between *subjective* rank in interest and *subjective* rank in ability in all courses combined as estimated by the persons themselves, discovered a coefficient of correlation of .57. Recognizing, however, the fallacy of depending on subjective estimations of ability, they correlated the subjective ranks in interest with the *objective* rating of abilities on the basis of academic marks and discovered a coefficient of only .25. They accordingly concluded that there is a very low degree of correspondence between interest in a subject and ability in it. There is a further significant indication in the figures just quoted in that the correlation between subjective ratings of interest and objective ratings of ability is much lower than that obtained when subjective ratings of ability are employed. (3)

One objection to all these results is that the interesting objects examined were of a special kind, being specific subjects of the academic curriculum. To argue from these results that there is a similar degree of correlation between degree of interest in adult vocational activities and capacities would be a questionable procedure. For the discovery of such conditions it would be necessary to study adults in a vocational milieu, asking several hundred workers to estimate the degree to which they are interested in their daily work; secure an objective measure of each person's success in his work; and correlate the two series. Until we have such measures we can make no positive statement regarding the relation between vocational interest and vocational ability.

Relation between Degree of Interest and Degree of General Intelligence.—Closely akin to the question of the relation between specific interest and specific ability is the question of the relation between degree of specific interest and degree of general ability. Since the development of scientific methods of measuring intelligence, some investigations have been made on this point.

Fryer, after measuring the intelligence of representatives of several occupational groups, set up standards representing the amount of intelligence of a number of men who said they were interested in certain vocations. He then investigated the amount of correlation that existed between degree of interest and possession of intelligence required by the vocation and discovered a correlation coefficient of .38. If Fryer's subjects—they were men who applied at a Y. M. C. A. vocational office for help in getting into a favorable vocation—had been placed in the fields in which they professed interest, the probability is that 51 per cent. would have been maladjusted; 15 per cent. because they did not have the required intelligence, and 36 per cent. because they had too much intelligence for the occupations in which they were interested. (11)

From figures gathered by Proctor regarding the interests of adolescent boys and girls it would appear that a still higher degree of maladjustment would be apparent if his subjects had been placed in the vocations for which they had expressed preference. (21)

Rotation of Interesting Objects.—Another fact that weakens the value of interest as a guide to vocational aptitude is that an individual changes his objects of interest from time to time. Since interest is a function of experience, there is bound to be a change of interest with new experiences. For example, a boy at the age of five may wish to be a mail-carrier like his father, at eight a railway engineer, at 12 a prize-fighter, at 16 a preacher, and so on. Several investigations have been designed to measure such changes of interest. Douglas reports that of high-school seniors in the State of Washington, 54 per cent. acknowledged that they had changed their vocational intention in the course of their lifetime. Considering the fact that none of them had yet embarked upon the vocations they were intending to enter when questioned, it is likely that a still larger number had changed since the time when they were questioned. (5)

Some light is thrown on this question by facts discovered by the author showing that 16 per cent. of the persons mentioned in *Who's Who in America*—probably the most stable members (vocationally considered) of the population—changed voca-

tions from one to five times (page 47). Although not all of these changes may have been prompted by shifts of interests, it is highly probable that at least some of them were. Of course the members of this group, being stable enough in their vocations to achieve the eminence of citation in *Who's Who,* would not be expected to have changed their interests very frequently. Otherwise they could not have persisted in an occupation long enough to achieve the success which they did achieve. Still, the fact that such a relatively large number did change their vocations shows that shifts of interests are common enough with this class. They are probably much more frequent in the mass of workers of less eminence.

Measurement of Interest.—In the light of these facts, it is evident that many difficulties are encountered in seeking to use interest as a basis for helping a person to become adjusted vocationally. Despite the difficulties, the matter is so important that resolute attempts should be made. Interest is primarily a psychological phenomenon; the science of psychology, therefore, should earnestly apply its technique to the problems of discovering interests and measuring their strength.

Objective Methods.—One method that has been employed is to present various objects before an individual and observe his reactions to each. An early unscientific form of this based on naïve psychology has been traditionally followed by certain families. On an infant's first birthday he is placed on the floor before an apple, a Bible, and a dollar. He is then left to himself for a little while. Presently the parents return to see which object he has selected. If it is the apple, he is considered to have been born with an interest in agriculture; if the Bible, the ministry; if the dollar, business. There is extant the record of one puzzling and versatile infant who performed the startling feat of sitting on the Bible, grasping the apple in one hand and the dollar in the other. The parents were at first nonplussed, but finally decided that such versatility of interests must indicate that the child should be a politician.

Recognizing that such methods are based on superstition, scientists have been trying to replace them with methods of a more scientific kind. Instruments have been developed that

measure reactions of exceedingly subtle kinds, and it has been hoped that by means of these instruments, reactions may be measured which will be significant for vocational guidance. A number of these instruments measure chiefly involuntary responses (those beyond the control of the individual) which presumably reveal the hidden things that interests are supposed to be. Under stress of the pleasant feelings evoked when one is interested, the heart-beat may change and this change may be recorded on an instrument called the sphygmograph; or the blood-volume in the veins may change as recorded by an instrument called the plethysmograph. If there is no interest in the stimulating object, the theory is that these changes will not occur and thus the instrument will record lack of interest. If there is violent dislike, it is supposed that the instrument in some way records that. One of the most fascinating of the instruments for measurement of involuntary changes is the galvanometer, which measures electrical changes within the body. It is an established fact that involuntary electrical changes occur within the body, and that they may be quantitatively recorded on the galvanometer. Accordingly this instrument has been proposed as a means of measuring the reactions—pleasurable, or unpleasurable—to various interest-evoking objects. (2)

The following newspaper account describes the method employed by one enthusiastic advocate of this machine.

"The principle underlying the 'character-reading' machine, as explained by Dr. von David, is that a person's mind will react by deflections to certain suggestive key words or pictures, indicative of various vocations.

"By curved lines such as are made on a seismograph or recording thermometer, the person's responses to the vocational suggestions form a permanent record.

"'Every human brain from its earliest period,' Dr. von David said, 'holds an inherent, dominant impulse or capacity which, if recognized early and properly developed, leaves no doubt as to the character of that person's true vocation in life, and each brain, together with its associated organs, nerves, muscles, and body processes, generates and can transmit a force whereby it can be

induced unconsciously and unequivocally to register the nature of that special individual gift.'

"Describing the working of the machine Dr. von David said:

"'The person upon whom the test is being made is seated at a table on which are two small glasses of mercury and a salt solution, which are connected by wires to an apparatus in another room. The index and middle fingers of the subject's right hand are placed in the glasses. The table is in a closed-off portion of the room and no other objects are visible to the subject except a sheet on which words or pictures may be flashed, The impulses or changes caused by the projection of various words and pictures are conducted through the wires from the mercury contact glasses, through an apparatus in an adjoining room, to a recording device in a third room, which has been darkened. The record thus made is superimposed on the curve of norms, and a new curve plotted as a result.'

"The recording device, the psychologist explained, is a galvanometer with an oscillograph connection. A moving pencil or reflected light writes on sensitized film the record of the subject's reflexes."

Promising as this instrument appears to be as an aid in diagnosis, its use for such purpose is beset with tremendous if not insuperable difficulties. In the first place, the needle of the galvanometer may deflect to the right for a stimulus which the subject reports as pleasant or interesting and at another time it may deflect to the right for a stimulus reported as unpleasant or uninteresting. Again it may deflect to the left for the same stimulus. Sometimes this stimulus will evoke no galvanic response. Accompanying this inconstancy in direction of deflection is an inconstancy in amount of deflection. A stimulus which at one sitting may cause a deflection of 10 degrees may at another sitting cause a deflection of only five degrees. Next comes the difficulty of determining the vocational significance of various stimulating objects. For example, what would a pen stand for? Would a positive response to it indicate that the individual should be a writer, an artist, or a bookkeeper? We have not mentioned all the difficulties which one encounters in trying to use the galvanometer for the measurement of vocational

interests, but we have given enough to show that it offers little help at the present time. (26) Our objections apply with equal force to the other instruments of objective measurement previously mentioned.

For another technique that may be used in the objective measurement of interests see Burtt. (4)

Subjective Methods.—The attempts to diagnose vocational interests have not been wholly confined to the objective methods. Some, and probably the greater number, have used the subjective approach. This consists in asking the subject what he is interested in. The attempt has been made to do this systematically and with scientific technique. The instrument employed is the questionnaire. One of the first of these used for diagnosis of vocational interests was devised by Parsons. It asks, "What are your favorite books, sports, magazines?" "What do you do with your leisure time?" etc. Out of this have grown a large number of questionnaires. One (copyrighted by J. B. Miner and sold by C. H. Stoelting Company, Chicago) contains questions such as these:

"Indicate the two groups of school subjects which have most interested you, by placing a figure 1 before that which has most interested you and a figure 2 before that which next most interested you. Within the chosen groups underline specific subjects preferred by you.

Art (freehand drawing, design, craft work).
History and Civics (American, ancient, mediæval, modern).
Science (general science, botany, chemistry, physical geography, physics, zoology).

Check these working conditions that you would prefer:

Indoor	Doing the same thing
Outdoor	Wide variety in work
Working by yourself	Thoughtful hand work
Working with others	Thoughtful head work

"Among the following desirable traits underline the seven in which you are strongest. Among the traits printed below, place crosses before the two in which you are the weakest: Accuracy,

common sense, concentration, foresight, imagination, information, obedience, patience, perseverance, etc." (17)

This type of measure has been applied to at least one group of workers (salesmen) in order to determine the kinds of objects in which they are interested. After significant information has been secured the method may conceivably have value with an applicant who is being considered for a vocation. (See Freyd (10) and Fryer (12).) Efforts are being made to incorporate such features in the application blank. (See Goldsmith (13).)

One of the greatest difficulties involved in the subjective method of measuring vocational interests is implicit in all uses of the questionnaire, namely, the difficulty of introspection. To look in upon one's own mind and report faithfully is a difficult undertaking. Even trained psychologists working under laboratory conditions find their ability taxed to the utmost. How much more helpless, then, are untrained observers of mental states when asked to describe their mental condition, and how much more difficult it is for extremely young persons such as those most often being examined by a vocational interest questionnaire. Add to this the facts about interest already discussed: An individual may have the interest but not the capacity required for success in a particular occupation; he may not be able to develop the abilities necessary for success in the occupation; he may cease to be interested in one set of objects and become interested in a new set; finally, he may not be able to detect that he is interested in any particular vocation. In view of all these limitations one must guard warily against placing much reliance on the result of interest questionnaires until a large amount of investigation has been carried on.

The Psychoanalytic Method.—Modern psychology is teaching that one may become interested in an object at a very early period of life though one may not be aware of the fact. In cases where an individual does not know his own mind there are probably early influences which have affected too deeply the hidden springs of conduct to be evident on the surface. In order to discover these 'subterranean' interests it has been proposed that one use the psychoanalytic method popularly associated with Freud of Vienna and Jung of Zurich. According to the psycho-

analytic method one searches objects in which the patient is clandestinely interested, by questioning him in long sessions, by studying his dreams, which are thought to be attempts to realize suppressed desires, sometimes even by hypnotizing him, and then asking him questions.

Several mechanisms have been proposed whereby these suppressed desires achieve realization in one's choice of vocation. For example, there are some people with the irresistible desire to see blood; the 'Freudians' say such a person covers up this tendency by choosing a vocation in which he can legitimately see blood, such as a surgeon (higher form) or butcher (lower form). One who subconsciously wishes to be on the move all the time may choose the vocation of travelling salesman or a position in the transportation service. Sometimes the individual seeks to erect a vocational barrier against the temptations to commit acts that would be classed as criminal by society; accordingly he may choose to be a judge or a minister, thus avoiding the opportunities of committing sin. The basis of some vocational choices may be described in terms of fetish worship. "A 'foot-fetishist,' who goes into raptures when he sees a nicely shod little foot, as did Retif de la Bretonne, will be driven to take up an occupation in which he has to do with feet. He may become a shoemaker, a chiropodist, or an orthopedist. Similarly a 'hand-fetishist' will choose manicuring before anything else. One who is a painter may be induced, by his interest in hands, to draw hands only. Another individual may gratify his interest by making a special study of reading the character from the hands. A third might occupy himself with the physiological function of the hand. A fourth might become a glove-maker. One of the latter once confessed to me that to see a beautiful hand affords him immense pleasure, only surpassed by the ecstasy of being permitted to kiss it! A poet will sing the praises of hands in his verse and will dedicate his drama to the beautiful hands of a lady —as did Gabriele d'Annunzio, who dedicated his Gioconda to the Beautiful Hands of Eleanore Duse.

"There are those whose sensual interest is centred on the hair. Hairdressers who are especially clever in elaborating artistic coiffures and who gain a reputation in their profession often

show an erotic interest in the hair. I knew a hairdresser who, while dressing very beautiful hair, would have a tingling sensation in his fingers which sometimes increased to a great feeling of excitement.

"The erotic interest is also found to be a decisive factor among doctors in the choice of the particular branch of the profession they take up—unless chance has been the only reason. One who admires beautiful noses becomes a nasal specialist; a passionate lover of women becomes a gynæcologist, and sublimates his Sadistic impulses into the life-saving purposes of a woman's surgeon; the 'ear-fetishist' will choose the ear for his specialty—and all this, of course, quite unconsciously and without being able to account to himself for this eager interest (or even wanting to do so)." (22)

Psychoanalysis of Children's Vocational Choices.—These unconscious substitutions for hidden interests are very common, say the psychoanalysts, among children. In the eyes of the child the vocation is the characteristic sign of the 'great.' This may be observed in the child's play. He clothes himself in grand adult apparel. The boy becomes a savage chief, while the girl becomes a school-teacher, thus being able to express authority.

Of especial interest is it to apply this theory to the vocational play-acting of the child in relation to the vocation practised by the parent. A boy regards his father as a force to be opposed (all apart from any Œdipus feelings he may have toward him). How can he best oppose him? The ingenious description of the process is given as follows: The possible choices of vocation that the child can make are limited by his limited experience. The vocational field that bulks largest with him is the one in which his father is engaged. The chances are, therefore, that he will most likely select a vocation in that field. It should be remembered that the father occupies a position of authority over the child—often a galling one. And the child wishes to rebel against it. He cannot do so openly, so he seeks to do so vicariously. He chooses as his vocational goal one that would enable him to occupy a position of 'greatness' like his father's, but a step above it. For example, if the father is a postman, exercising the showy and authoritative right to

open letter-boxes and appropriate their momentous contents, the boy may choose to be postmaster, where he will have still higher authority, and, especially, authority over the father. The son of the janitor of the school may wish to become the principal of the school so that he can exert authority over his father.

The desire to shake off parental authority does not necessarily express itself in exactly this way. It may lead the child to choose a faring vocation, one that will take him away from home. To this is ascribed the great attraction of the callings connected with the transportation service. Their popularity was shown in an investigation conducted by Kramer, and reported by Adler (1), in which 57 per cent. of the children questioned expressed a desire for an adventuresome calling that would take them away from home, or that would keep them on the move. A life of movement seems to serve in some way as an index of superiority. Children are undoubtedly impressed by the celerity with which adults—their parents—get out of the way (a sign of acknowledging their inferiority) of taxi-drivers, railway engineers, street-car motormen, and the like. The story is told that John D. Rockefeller jumped nimbly out of the way of a truck moving rapidly down upon him with the remark, "Even a truck-driver is superior to a millionaire."

Vocational Choice an Index of Inferiority Feelings.—The vocational choice offers opportunity for escape from inferiorities. One who has a physical defect will seek an occupation where he can compensate for that defect. One who through weakness or ineptness during childhood could not participate in rough games will choose a vocation where his failings will not be noticed, and where he can become so skilful that he will compensate for his frailties. In the consciousness of being an expert in colloids, Greek roots, or some other obscure and even 'impractical' field, he may attain the satisfaction and self-esteem that were denied him in early life. This is alleged to be one reason why there have been so many physical weaklings among the intellectually great. It is a matter of common observation that a lack of some sort acts as a spur to effort. The handicap serves to arouse a combative attitude and to furnish enough energy so that the individual achieves more, possibly,

than he might have accomplished without the difficulty. Aside from this, however, one must account for the particular direction that the energy takes, for the particular sphere in which the individual chooses to make his exertion. This explanation is in terms of suppressions already cited. (The Freudian school, with its insistence on the strength of the sex impulse, classifies all these suppressed desires as sexual.)

The inferiority need not necessarily be physical; it may be mental, such as a low degree of intelligence. One may be subconsciously aware of such a defect and choose a vocation in which he can compensate for his lack of intelligence by utilizing some other trait. (It is conceivable that the traditional moving-picture actress may be endeavoring subconsciously to compensate with her pretty baby-stare for a mediocre or even inferior intelligence.) Attempts to cover up phobias by means of particular vocational choices are also pointed out.

These explanations of vocational choice sound bizarre and far-fetched to straightforward American ears. Though we may not subscribe whole-heartedly to such explanations we must recognize that among the multifarious motives leading one to be interested even superficially in one occupation rather than in another, there are probably some factors of this hidden sort, and though we need not accept them in their entirety, still we may properly admit that with certain persons they may conceivably operate, and that the psychoanalytic method may sometimes give light.

Summary.—We have endeavored in this chapter to show the rôle that interests may play in vocational adjustment. We asserted first that interests should not be regarded as static entities of a mysterious nature which can be catalogued and which in some mysterious manner motivate vocational activity. We affirmed on the contrary that they should be regarded as forms of activity. In harmony with this conception we tried to speak of them in verb form, as ways of acting. In a rough way vocational interest might be thought of as a drawing toward and identifying of one's self with a vocation. We also asserted that interests in vocations are not inborn but are cultivated during experience. Since they are not always purposely cultivated they may come as the result of experiences that have

passed out of remembrance. This fact gives rise to many difficulties in determining their significance. An individual may never have developed an interest in any vocation. He may be equally interested in several objects of vocational significance. He may not have abilities to cope with the objects in which he is interested. He may be capable of becoming interested in a large number of vocations that have never been brought within his experience.

In our survey of the attempts that have been made to study vocational interests we distinguished several methods. Objective methods consist of measuring the responses, voluntary or involuntary, which people make toward objects representative of various vocations. The responses are of such kinds as the hastening and retardation of the heart-beat, changes in blood-pressure and blood-volume, changes in breathing, electrical changes. The most dramatic of these devices, illustrated by the galvanometer, were found to be quite unsuitable, partly because of the difficulty of securing unambiguous symbols of various vocations, partly because of the inconsistency of the responses that are elicited, partly because of the technical obstacles encountered in the manipulation of the machines, and finally because they are probably accompaniments of sudden claims on the attention rather than exclusive accompaniments of the interested attitude.

The subjective methods were found to be most frequently based on the use of the questionnaire. Some of the difficulties connected with its use are: the individual may not know what he is most interested in; he surely does not know how many vocations he can become interested in; and he may possibly try to conceal some of the facts. We have traced the development of the questionnaire from the early unstandardized form used by Parsons to the present time; we observed a tendency in the direction of giving the questionnaire greater and greater objectivity. In spite of its difficulties it shows promise of being practically useful, particularly when used in the form of an application blank. Another approach to interests is that of the psychoanalytic method. In its present form it seems to be bizarre and even

visionary but it serves to emphasize a certain aspect of the problem.

It should be kept in mind that interest is at best only a single factor in vocational adjustment; that it must always be considered in connection with intelligence and other forms of ability. While common sense dictates that one should not choose a vocation at decided variance with one's established interests, still interests are so largely evolved in experience that one may well consider the possibility of developing them according to the principles laid down in Chapter Two. It is probable that the evolutionary view there presented will lead to the best solution of the problem concerning the relation of interest to vocational adjustment.

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CHAPTER IX

THE RÔLE OF INCENTIVES IN VOCATIONAL ADJUSTMENT

Loose Use of Word 'Incentive.'—Much is being said and written nowadays about the motives that animate industrial workers. Long lists of incentives are postulated: individual instinctive ones, such as acquisitiveness, constructiveness, workmanship; social instinctive ones, such as leadership, rivalry, imitation; Freudian ones, such as suppressed desires for self-expression, repressed loves and hates, etc. These attempts at enumeration and classification are defective in that they picture incentives as being veritable entities and as having existential singularity. (4) (5) (6) (7)

True, it must be admitted that there are things which serve as incentives to workers. They characteristically operate, however, in a concrete setting, and their results are the outcome of a complex situation. To describe them one cannot blandly hypothesize them as bare abstract forces; one must instead (a) delineate them concretely in their work-setting, and (b) measure their effects in work-terms. In order to realize these aims, a manufacturing establishment was entered where workers were motivated by a thoroughly planned system of wage-payment, and where the accurately kept records of individual performance enabled the author to measure the effects of the incentive over a considerable period of time.

Description of a Concrete Investigation.—The data used in the investigation consist of the records of output of 40 experienced hand compositors who were hired (at intervals) during the years 1918 and 1919, and who remained at least until January, 1921. There were others hired during this period, but their records are not included, being incomplete in one respect or another. The production records of these men were kept during the first 20 weeks of their employment and were tabulated again at three months' intervals from October, 1920, to July, 1921.

The scale upon which the output was measured is the product of a rather complicated task-setting process involving the preliminary determination, by means of time-studies, of the number of lines (of each kind of matter) that an expert compositor could set in an hour. This was then considered as the level of 100 per cent. efficiency. Seventy-five per cent. on this scale was taken as a standard that might be regarded as a fair day's work, and every compositor was paid a flat hourly rate whether he reached this 75 per cent. point or not. But he was told that as soon as he exceeded it he would receive an additional sum—two-thirds of one per cent. (of the flat rate) for every unit on the scale. For example, for reaching the 85 per cent. mark he would receive a premium amounting to 6⅔ per cent. of the flat rate; for reaching the 100 per cent. mark, a sum amounting to 16.5 per cent. of the flat rate. He might even exceed the 100 per cent. mark, as may be seen in Table XXI, for all of which he would be paid the corresponding premium. (It might be stated that the establishment is a non-union plant paying wages higher than the established union rates.)

Here were conditions favorable to the investigation of incentives—an incentive defined in concrete terms, and an arrangement for measuring the output that it was designed to affect. From the data thus obtained may be answered several questions of concern to practical industrial management and to psychoeconomic theory. The results will be presented in terms of the answers to these questions: Did the output increase under this system of wage-payment? If so, to what extent? How soon did the output rise to the 75 per cent. mark? What was the rate of increase thereafter? What was the maximum point of efficiency reached? When was it reached? Did the compositors with relatively long experience make greater improvement than those with less experience?

Results. In answer to the first two of these questions, the results show a decided increase in output. Table XXI and Figure 12 show that from an average of 59 at the end of the first week the output increased to 105, or 78 per cent.

(It may be interposed here that the work of new employees might be expected to improve as they become used to working

TABLE XXI

Showing Age, Years of Previous Experience, and Per Cent. of Efficiency Reached by Each Compositor at Various Intervals

Compositor	Age	Years experience	Number of weeks on the job						Oct. 1920	Jan. 1921	Apr. 1921	July 1921
			1	4	8	12	16	20				
I..	29	14	39	73	100	119	131	149	94	100	94	93
II..	29	6	50	75	98	95	104	138	114	116	.....	.....
III..	25	5	57	108	99	112	124	128	84	109	107	110
IV..	38	.....	41	78	95	117	116	119	69	80	.....	.....
V..	41	16	64	127	114	128	134	119	114	122	107	121
VI..	24	6	49	97	87	100	108	118	134	132	132	129
VII..	23	8	46	45	82	103	95	118	99	103	.....	.....
VIII..	26	6	70	111	115	110	112	115	119	108	109	109
IX..	25	7	82	70	101	104	115	115	113	102	.....	.....
X..	29	12	92	94	99	104	109	110	111	117	.....	.....
XI..	39	7	54	94	76	93	102	110	109	109	113	106
XII..	25	4	54	75	89	120	102	110	113	108	120	107
XIII..	31	8	55	50	72	77	80	104	108	96	109	103
XIV..	35	8	78	80	87	78	80	104	80	81	89	86
XV..	44	27	43	71	66	76	91	104	80	87	90	109
XVI..	29	9	71	96	107	125	113	102	118	107	.....	.....
XVII..	32	16	69	55	72	90	85	101	83	82	.....	.....
XVIII..	.....	11	102	105	112	100	99	100	105	107	.....	.....
XIX..	31	11	78	92	95	91	96	100	106	99	104	100
XX..	39	.....	53	65	83	92	96	99	.....	54	.....	.....
Total..	594	181	1,247	1,661	1,849	2,034	2,092	2,263	1,954	2,019	1,174	1,173
Average	31.2	10.0	62.3	83.0	92.5	101.7	104.6	113.2	102.8	100.9	106.7	106.6
XXI..	45	20	54	59	66	83	101	98	.....	90	.....	.....
XXII..	32	7	50	96	113	104	111	97	107	105	111	109
XXIII..	36	15	63	99	103	98	105	92	107	105	.....	.....
XXIV..	36	.....	44	72	84	79	80	91	108	96	.....	.....
XXV..	23	6	52	86	107	91	80	90	115	115	115	105
XXVI..	39	7	61	93	80	81	94	90	86	81	85	86
XXVII..	29	9	52	76	75	93	92	89	110	97	103	103
XXVIII..	35	8	80	46	60	106	114	88	105	102	108	110
XXIX..	30	10	62	50	52	60	64	87	.....	100	.....	.....
XXX..	40	10	77	71	80	87	95	86	110	109	.....	.....
XXXI..	39	20	80	54	65	81	84	82	..	91	85	89
XXXII..	28	9	44	60	54	47	53	79	98	90	87	100
XXXIII..	25	.....	73	105	94	100	112	79	113	103	111	109
XXXIV..	24	8	54	84	95	96	83	78	85	86	.....	.....
XXXV..	39	21	49	63	59	79	114	74	75	66	.....	.....
XXXVI..	37	17	39	47	64	62	64	72	.....	92	.....	.....
XXXVII..	49	11	56	57	44	55	76	71	88	73	73	73
XXXVIII..	30	6	50	58	75	71	79	70	95	73	.....	.....
XXXIX..	18	1	26	40	20	41	41	63	.....	55	.....	.....
XL..	29	5	42	43	50	56	76	51	119	108	107	103
Total..	663	190	1,108	1,359	1,440	1,570	1,718	1,627	1,621	1,837	998	989
Average	33.2	10.6	55.4	67.9	72.0	78.5	85.9	81.3	108.0	91.9	99.8	98.9
Grand total.	1,257	371	2,355	3,020	3,289	3,604	3,810	3,990	3,574	3,856	2,162	2,162
Grand Average...	32.2	10.3	58.8	75.5	82.2	90.1	95.3	97.3	105.[7]	96.4	103.2	102.9

in a new plant, quite apart from any unusual wage incentive. Probably this cannot be denied. This report constitutes merely a portrayal of the output of this particular group of workers

under the conditions described. It is presented as a pattern according to which the influence of incentives upon industrial workers may be approached experimentally instead of speculatively.)

Not only did the average output increase, but the individual output also increased in every case during the first 20 weeks, except that of Compositor XVIII, which diminished two units on the scale of efficiency (though it should be remarked that this worker started with 102, the highest initial record). The amounts of increase during this period range from two (XXXI) to 110 (I), with an average of 38.9 (A.D. 19.3). Thirty-four, or 85 per cent., of the 40 reached the 75 per cent. mark during their first 20 weeks. Measures taken later show that all but one (XXXIX) attained the required standard at some time or other.

The average output reached the 75 per cent. mark at the end of the fourth week. Inspection of the progressive amounts of output showed nothing to be gained for the purposes of this investigation by considering the output of every week; and so only the measures of every fourth week are presented. The average amounts gained at each of these periods are shown in terms of units on the scale of efficiency, and in terms of per cent. of increment, in Table XXII. The greatest increments occurred

TABLE XXII

Showing Amounts of Gain at Four-week Intervals

Intervals	Units	Per cent. increment
First to fourth week	17	28
Fourth to eighth week	7	8
Eighth to twelfth week	10	12
Twelfth to sixteenth week	2	2
Sixteenth to twentieth week	2	2

in the order: fourth week, twelfth week, eighth week, sixteenth week, twentieth week. And, as will be seen in Table XXI and Figure 12, another level of increase was registered October 31, 1920.

As shown in Table XXI and Figure 12, the maximum average point is 105. This is the record for October 31, 1920. Exactly

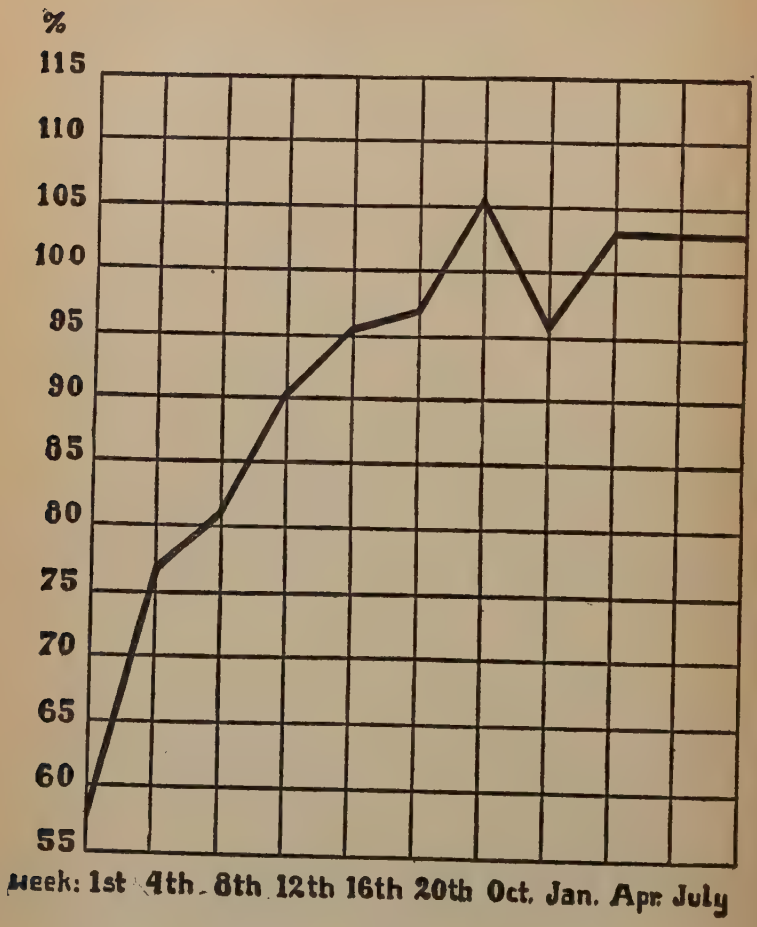
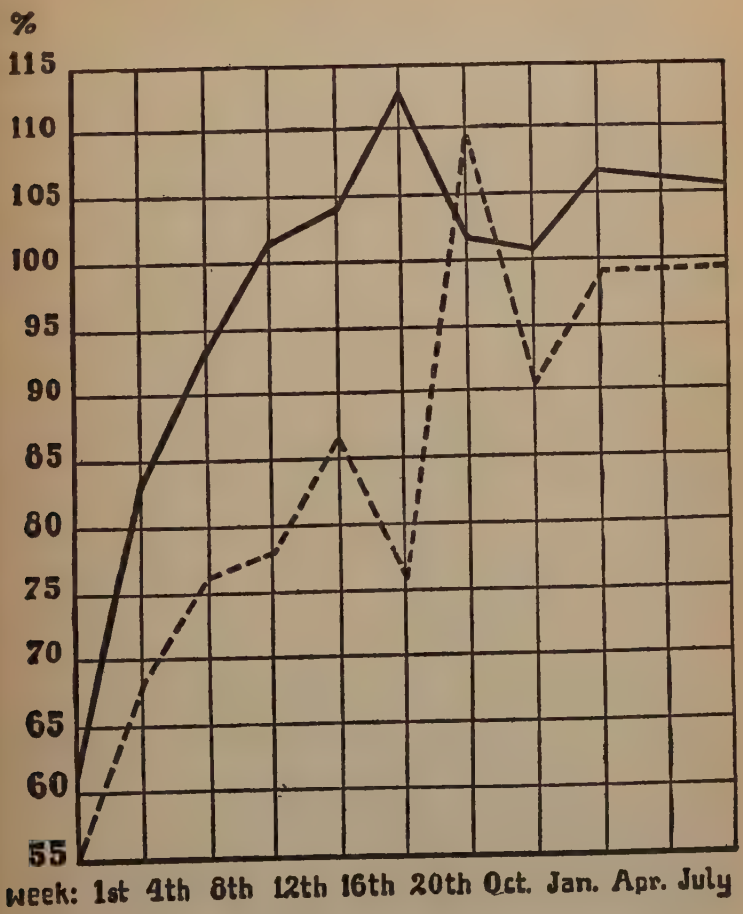

%
115
110
105
100
95
90
85
80
75
70
65
60
55
Week: 1st 4th 8th 12th 16th 20th Oct. Jan. Apr. July

FIG. 12.


%
115
110
105
100
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85
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65
60
55
Week: 1st 4th 8th 12th 16th 20th Oct. Jan. Apr. July

FIG. 13.

how long this was after the initial employment varies according to the dates at which the various individuals were employed, during the years 1918 and 1919. The tale told by these average amounts, however, when scrutinized closely, is found to misrepresent conditions. For on the basis of their output at the end of their twentieth week of service (see Table XXI) the compositors were divided into two groups. Averages computed for each of these groups show that the two followed similar courses (see Fig. 13), but on widely separated levels of efficiency. The better group began at 62.3 and closed the twentieth week at 113.2; the other began at 55.4 and closed the twentieth week at 81.3; the two groups gaining during the period, 51 units (82 per cent.) and 26 units (47 per cent.) respectively.

After the twentieth week the records of these two groups show further differences. The group that had turned out the most work and had made the greatest gain now began to turn out less work; while the other group continued to gain. As shown in Table XXIII, by October 31, 1920, only eight of the upper

TABLE XXIII

Showing Gains and Losses Compared with Records of the Twentieth Week

Group	Gains				Losses			
	Oct. 31, 1920		Jan. 31, 1921		Oct. 31, 1920		Jan. 31, 1921	
	No.	Amt.	No.	Amt.	No.	Amt.	No.	Amt.
Upper half.....	8	5.6	5	7.2	12	22.6	15	19.1
Lower half.....	14	17.8	16	15.1	1	4	4	8.3

twenty were still gaining (with an average of 5.6 units); while of those in the lower half (only 15 of the 20 records are complete) fourteen gained an average amount of 17.8. By January 31, 1921, these differences were accentuated. Of those compositors in the upper half only five gained, with an average gain of 7.2; while of the 20 in the lower half, 16 gained, on the average, 15.1. The records thereafter show the same relative positions.

To compute the amounts lost is also revelatory. The com-

positors in the upper half lost an average amount of 22.6 by October, 1920; 19.1 by January, 1921; while those in the lower half who lost had lost only four units and 8.3 units by these two dates.

Explanation of Curves.—To explain the curve of the lower group with its relatively low beginning and its slow ascent during the first 20 weeks, we may infer that the members of this group were the less adaptable ones of the compositors. Why their output kept on increasing after that of the upper half had ceased to increase may be:

1. Because the effect of the premium was still operating with them until October, 1920.

2. Again, they may have been spurred on by the example of the upper group so far above them.

3. It might be supposed that the lower group kept on gaining because they had had less experience in the trade and thus had more to learn than the others. This supposition is belied, however, by two facts: (*a*) that they started only seven points below the others, surely not great enough handicap to account for the great difference of thirty-two at the twentieth week; and (*b*) that according to the records (see Table XXI) the two groups had had the same average number of years' experience—ten.

To explain why the work of the superior half diminished in quantity after the twentieth week with its average record of 113.2, requires more complex hypotheses. Four guesses may be hazarded:

1. Though the premium was high enough to stimulate these workers to a plane of 113.2, it was not strong enough to keep them there. Its power as a stimulating force may have died down with the passage of time, much as does the power of a simple sensory stimulus in the common phenomenon of sensory adaptation. Or, the members of the group may have concluded, overtly or not, that the reward was not worth the effort required to keep the output at the 113.2 mark. Experience as reported by Marot seems to favor this view: "As fair or as superior as the bonus may be in relation to the prevailing rate in the market,

managers say that the workers are apt in time to fall below the standard as their work becomes routine, unless the incentive after a time is increased or changed in character. In other words, the wage incentive is like a virus injection. The dose is not continuously effective, except as the amount is increased or altered." (4)

2. It is conceivable that by the twentieth week the upper group had reached the highest level they were physiologically capable of attaining, and one too high to maintain indefinitely; that nature forced the succeeding drops. This appears rather likely from the fact that the lower group also decreased their output slightly after reaching their peak of October, 1920.

3. An outsider might suggest that perhaps as the upper group became quickly proficient, they were given slightly more difficult grades of work on which they could not work so fast. This explanation does not have much weight, however, since all the jobs in the department were prorated in difficulty, and the units in which the output was measured were always the same—standard-hours based upon accurate time-studies.

4. **Stereotyping of Output.**—In the opinion of the writer there is strong likelihood that we have here an interesting form of 'stereotyping of output,' " that is, form of output in which the same individual or group of individuals will turn out day after day and week after week practically the same quantity of finished product. In one munition factory engaged in the manufacture of fuses a large proportion of the force was thus working. In forming at a capstan lathe the large end of the fuse, one man finished exactly 1000 pieces on each of 44 nights out of 45 that were observed; in gauging the fuses five girls out of six that were studied for one week, examined 1315 fuses each day. . . . If work were stopped for a brief period for reasons beyond the power of the worker to control, such as the temporary crippling of a machine, the stoppage was likely to be followed by a spurt and, without overworking his powers, the worker finished the day with the usual production to his credit. . . . In the factory mentioned piece-rates were paid, and the worker by doing more could earn more wages, and yet he limited his work." (3)

It is thus possible that these 40 compositors tacitly decided that an average output near 100 was good enough. All worked hard until they reached it. Some (the upper half) reached it quickly, and certain ones of these far exceeded it, having perhaps higher ideals regarding output, or having greater powers. The lower half approached 100 less rapidly; but as they reached it the upper half reduced their output (so as to keep the average around 100?). It is significant that the average remains at 102, just above the point which, the management say, is regarded by the workers as the point below which they might be discharged in time of slack work.

One cause that has been ascribed to this phenomenon of 'stereotyping of output' is the practice that prevails at some industrial plants, of lowering the piece-rate or raising the standard task required when, in the opinion of the management, the worker is earning too high wages. The fear of this happening could not have been operative in the present instance, however, because the management has made a rule, to which it adheres scrupulously, that a rate once established will never change.

Experience and Increase in Output.—It now remains to discover the influence of former experience upon individual output. The question may be stated, Did the compositors with long experience develop greater output than those with less experience? Table XXIV shows that the years of experience of the 36 men whose experience could be determined at time of this writing, ranged between 1 and 27. The median was between 8 and 9, A.D. 4. The average for the more experienced half is 14.3; that for the less experienced half, 6.1. The 18 men above the median in experience, though starting at a relatively high plane of output (63), reached by the twentieth week, by October, 1920, and by January, April, and July, 1921, respectively, 95, 99, 97, 93, and 99 The 18 with less than median experience, while starting at only 56, achieved average outputs for the above-named periods of 99, 105, 105, 109, and 105.

We may conclude, therefore, that those with longer experience did not, because of it, turn out more work. Indeed they did not turn out so much work as those with less experience. (See

Table XXIV and Fig. 14.) The explanation may be that they were older and consequently slower in movement, being on the average 37.7 years old, while those of less experience averaged

TABLE XXIV

Showing Output in Relation to Years of Experience
(Thirty-six Men)

Compositor	Age	Years experience	Number of weeks on the job						Oct. 1920	Jan. 1921	Apr. 1921	July 1921
			1	4	8	12	16	20				
XV	44	27	43	71	66	76	91	104	80	87	90	109
XXXV	39	21	49	63	59	79	114	74	75	66	.....	.....
XXI	45	20	54	59	66	83	101	98	.....	90	.....	.....
XXXI	39	20	80	54	65	81	84	82	.....	91	85	89
XXXVI	37	17	39	47	64	62	64	72	.....	92	.....	.....
XVII	32	16	69	55	72	90	85	101	83	82	.....	.....
V	41	16	64	127	114	128	134	119	114	122	107	121
XXIII	36	15	63	99	103	98	105	92	107	105	.....	.....
I	29	14	39	73	100	119	131	149	94	95	94	93
X	29	12	92	94	99	104	109	110	111	117	.....	.....
XVIII	.....	11	102	105	112	100	99	100	105	107	.....	.....
XIX	31	11	78	92	95	91	96	100	106	99	104	100
XXXVII	49	11	56	57	44	55	76	71	88	73	73	75
XXX	40	10	77	71	80	87	95	86	110	109	.....	.....
XXIX	30	10	62	50	52	60	64	87	.....	110	.....	.....
XXXII	28	9	44	60	54	47	53	79	98	90	87	100
XVI	29	9	71	96	107	125	113	102	118	107	.....	.....
XXVII	29	9	52	76	75	93	92	89	110	97	103	103
Total	607	258	1,134	1,349	1,427	1,578	1,706	1,715	1,399	1,739	743	790
Average..	35.7	14.3	63.0	74.9	79.3	87.7	94.8	95.3	99.9	96.7	92.9	98.8
VII	23	8	46	45	82	103	95	118	99	103	.....	.....
XIII	31	8	55	50	72	77	80	104	108	96	109	103
XIV	35	8	78	80	87	78	80	104	80	81	89	86
XXVIII	35	8	80	46	60	106	114	88	105	102	102	110
XXXIV	24	8	54	84	95	96	83	78	85	86	.....	.....
XI	39	7	54	94	76	93	102	110	109	109	113	106
XXII	32	7	50	96	113	104	111	97	107	105	111	109
IX	25	7	82	70	101	104	115	115	113	102	.....	.....
XXVI	39	7	61	93	80	81	94	90	86	81	88	86
XXXVIII	30	6	50	58	75	71	79	70	95	73	.....	.....
VI	24	6	49	97	87	100	108	118	134	132	132	129
II	29	6	50	75	98	95	104	138	114	116	.....	.....
XXV	23	6	52	86	107	91	80	98	115	115	115	105
VIII	26	6	70	111	115	110	112	115	119	108	109	106
III	25	5	57	108	99	112	124	128	84	109	107	110
XL	29	5	42	43	50	56	76	51	119	108	107	103
XII	25	4	54	75	89	120	102	110	113	108	120	107
XXXIX	18	1	26	40	20	41	41	63	.....	55	.....	.....
Total....	513	113	1,010	1,351	1,506	1,638	1,700	1,787	1,785	1,789	1,308	1,260
Average ..	28.5	6.3	56.1	75.0	83.7	91.0	94.4	99.3	105.0	105.2	109.0	105.0

28.5 years. More likely, however, they were simply more firmly settled in habits of work, some of which were undoubtedly inefficient. Those with less experience did not have their bad habits

so firmly established, and they could make changes in method with greater ease.

Increased Production a Function of Learning New Methods.—In short, there seems to be strong indication that the greatest part of the increase in output on the part of all these 40 compositors came about through the elimination of wasteful methods and the acquisition of economical methods of work. The curves, both that showing the average scores for the entire group (Fig. 12) and those showing the average scores for the two halves (Fig. 13), show the characteristics usually ascribed to typical learning curves: irregularity, plateaus, relatively long period of time to develop, and ultimate stability. (1)

The results suggest that in so far as such a wage premium is considered as a tool for the stimulation of increased output it should not be regarded as an incentive-device that will make the worker increase his output solely by exerting sudden efforts of will. If such were the case, the output would be expected to rise to its maximum immediately upon application of the premium offer. In spite of supposedly vigorous efforts, however, these workers did not reach their maximum output for many months, indicating that something was needed besides sheer effort of will; that what occurred, indeed, was the elimination of obstructive movements and the invention of more effective methods. (As already shown, those with long experience did not improve so much as did those of shorter experience, who were less heavily cumbered with deep-seated inefficiencies.)

It follows, therefore, that the charge voiced by some spokesmen of labor, that premium-incentives and other 'speeding-up' devices are wrong because they bring increased output at the expense of the worker's health, is not wholly justified. (2) The fact that these compositors maintained the level finally attained throughout the two years covered by this investigation is surely some indication that they were not seriously overtaxing themselves. The truth probably is that they did the more efficient work with less physical fatigue than they did the early less efficient work.

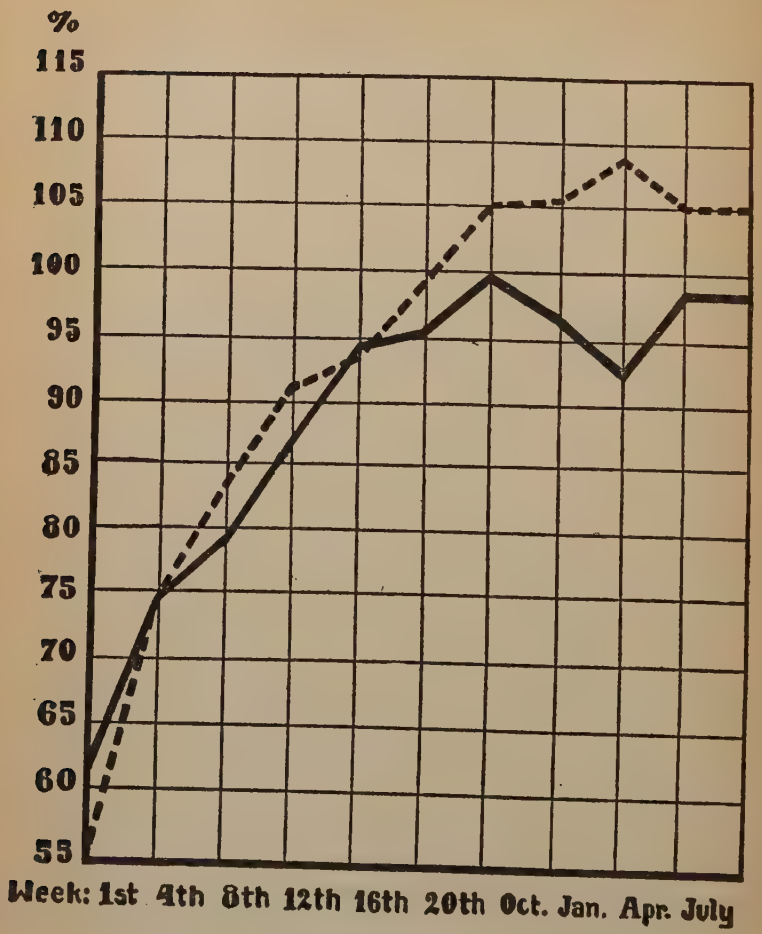
%
115
110
105
100
95
90
85
80
75
70
65
60
55
Week: 1st 4th 8th 12th 16th 20th Oct. Jan. Apr. July

FIG. 14.

Conclusions and Summary.—1. Under the conditions of work obtaining in this plant, the compositors observed, although having on the average 10 years of experience before entering this plant, improved markedly under the system of wage-payment described—improved individually and *en masse*.

2. The amounts of improvement varied during the first 20 weeks between two and fifty-five units on the scale of efficiency, with an average of thirty-nine units, or 64 per cent.

3. The rate of improvement was irregular, the greatest increase during any of the four-week periods occurring during the first four weeks; the next greatest, during the third four-week period.

4. The average output reached the 75 per cent. mark at the end of the fourth week; reached the highest peak on October 31, 1920; then fell back to what appears to be a permanent level at 102.

5. The group appears to have been composed of two rather distinct types: one group of 20 who increased their output rapidly during the first 20 weeks, reaching a maximum of 113, and then falling down to an average output of 107; another group of 20 who increased their output more slowly (to a maximum of 109 in October, 1920), and then found a level of 99. Various factors may have contributed to these differences:

a) Those in the first-mentioned group may have been the more freely adaptable of the compositors.

b) The reason they lessened their output below the maximum of the twentieth week may be that they did not see enough reward in the premium to repay them for making the effort necessary to maintain the maximum.

c) Again it is possible that the maximum—113.2—was above the physiological level that could be maintained with comfort.

d) Those in the slower group may have been stimulated to increase their output longer than the others, by the example of the others.

6. The records give strong indication that many, and probably all, of these workers, wittingly or unwittingly, participated in a 'stereotyping of output'; that though capable of doing a

larger amount of work, they endeavored to do just enough, as one manager put it, "to remain safely above the 100 percentage efficiency mark and thus insure that they would not be among those discharged during periods of slack work."

7. Long experience is not necessarily associated with high output. The less experienced half of these workers made higher ultimate records and greater relative gains than did the more experienced ones, the reason ascribed being that the former possessed fewer harmful habits to be eradicated.

Revision of Concept of 'Incentive.'—Finally, this analytical study of output gives basis for a revision of the current conception of industrial incentive:

a) An industrial incentive is not necessarily a brutal whip which, for the sake of swelling an employer's profits, goads a workman to labor to his own detriment. Instead, it may be a beneficent device that leads the worker to produce more by eliminating wasteful movements and substituting time- and effort-saving movements, certainly with financial profit to himself and probably with less weariness than under the old methods.

b) An incentive seems to reach a point where it ceases to evoke further increase in output. It may lose further stimulating power as does a stimulus in the phenomenon of sensory adaptation; it may lead the worker to reach a true physiological level; or it may encounter the phenomenon described as 'stereotyping of output.' Probably it is subject to the influence of all these factors.

c) An industrial incentive should be regarded as a concrete thing rather than as an abstract entity; to be defined in exact terms, and described in its actual setting, which is composed of various influences, physiological, social, etc.

d) To be truthfully described, its results must be stated in quantitative terms. Speculation only leads to futile wandering and confusion. Only by the slow and painstaking observation of workers and the collection of records of actual output can we arrive at an understanding of the way in which an incentive affects a worker.

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CHAPTER X

OTHER PSYCHOLOGICAL FACTORS IN VOCATIONAL ADJUSTMENT

Necessity for Considering Individual from all Points of View.—Throughout this book we have maintained that effective vocational adjustment requires that the individual (as well as the vocation) be considered from all points of view: economic, social, physical, physiological, and psychological. Paying chief attention to the last-named of these fields, we have discussed prominent components of vocational fitness: intelligence, special abilities (innate and acquired), and interests. We shall now consider a group of psychological factors upon which less information is available, but to which we must give careful attention in all our vocational psychologizing.

Volitional Factors.—One prominent group are called in psychological terms volitional, which means that they are concerned with what is called, in the language of the street, the will. More specifically, they comprise such activities as are ordinarily designated industriousness, honesty, reliability, etc. As was said in the preceding paragraph, there is a paucity of information regarding this side of human nature. No scientific tests have been devised, for example, that will tell whether a worker will be industrious or lazy, honest or dishonest, prompt or tardy in a certain vocation.

Attempts to Test Volitional Traits.—Just as attempts have been made to describe the requirements of a vocation in terms of abstract psychological traits such as honesty, perseverance, accuracy, leadership, self-reliance, (see page 62), so attempts have been made to describe the characteristics of candidates for vocations in the same terms. Tests have been proposed for the measurement of such alleged traits. Thus, a test for the trait of ingenuity is advertised by a certain publishing house in the following words: "Among the functions tested by this series are: (1) clear-headedness; (2) ability to pick out sig-

nificant cues; (3) knack of relating seemingly unrelated factors; (4) discrimination of differences by noting basis of difference; (5) methodical procedure in placing facts; (6) ability to detect a flaw in a plausible position; (7) ability to set down a point clinchingly."

Difficulties attend the establishment of such tests, first because we do not know what classifications are valid. Furthermore, we do not know that an individual who is, for example, aggressive in punching holes in a piece of apparatus during a psychological test would be aggressive in selling real estate. In other words, there is considerable doubt that these volitional traits about which we talk so glibly are really general. Neatness, for example, which is generally regarded as a trait to be equally well manifested in all of a person's activities, has been found by actual investigation to manifest itself in high degree in one field without manifesting itself in other fields. Many a man who scrupulously refrains from robbing his neighbor's flower-bed will, nevertheless, consider it perfectly good ethics, on returning from a foreign tour, to withhold customs declaration of some purchase that he has made. Such a man, we should say, is sometimes honest and sometimes dishonest; so with other volitional traits.

Downey Conception of Will-temperament.—Despite such discouragements earnest attempts are being made to devise some way of testing volitional traits. Downey has formulated a view regarding some of these traits and has devised a scheme of measurement which has attracted wide attention. Her view is that one important side of human nature may well be called will-temperament. This, it should be said, is not the emotional thing that is often called temperament; it is the more active thing which, if not will, is closely akin to it. It is a "relatively permanent innate disposition." By it, "no mysterious power is to be understood; it refers merely to the dynamic pattern of the individual." Variations in will-temperament occur from one individual to another, which may be expressed in terms of 'patterns.' The phases of a pattern are: "(1) those of speed and fluidity of reaction; (2) those of forcefulness and decisiveness of reaction; (3) those of carefulness and persistence of reaction." (4)

It is on the basis of this division that Downey believes voli-

tional traits can be measured, and she has devised a method of measuring them through forms of motor reaction. Since these activities are essentially a forthputting of energy, this forthputting of energy may be spoken of in terms of nervous energy. It is really the expression of: " (1) the amount of nervous energy at the disposal of the individual; and (2) the tendency of such nervous energy to discharge immediately into the motor areas that innervate the muscles and glands; or, on the contrary, to find a way out by a roundabout pathway of discharge. Hyperkinetic, or explosive, discharge tendencies in a given individual result from a high level of activity or from great simplification of pathways in the nervous system (absence of inhibition). Hypokinetic, or inhibitive, trends result from a low level of activity or from undue elaboration of impulses in the brain centres. Temperaments range from one extreme to the other."

Tests of Handwriting.—As a form of motor expression that might lend itself to the purposes of such measurement, Downey† chose handwriting. It is a forthputting of energy and it can be measured with respect to speed and fluidity, forcefulness and decisiveness, carefulness and persistence. Accordingly, she devised about a dozen tests that require the subject to write. The conditions of his writing are changed from time to time; for example, he is required to write while being distracted, to write as fast as possible, as slowly as possible, to disguise his writing, etc. His writing under all these conditions is compared with his normal writing. It should be understood that this system of testing does not depend on such measurements as those made by the professional graphologist who deduces the presence of certain character traits from the width of the stroke, height of letters, etc. It is rather a system of comparing activity under normal conditions with activity induced by specially arranged conditions that supposedly call for volitional adjustments of the sorts mentioned above.

The Will-profile.—The arrangement of the patterns of the temperament are shown graphically in the form of a 'profile.' That is, the standing of the individual in each of the tests is shown graphically on a scale from 1 to 10. The graph here reproduced is commented on by Downey as follows: " Mobile-

† From Downey: The Will—Temperament and Its Testing. Copyright 1923 by World Book Co., Yonkers-on-Hudson, N. Y.

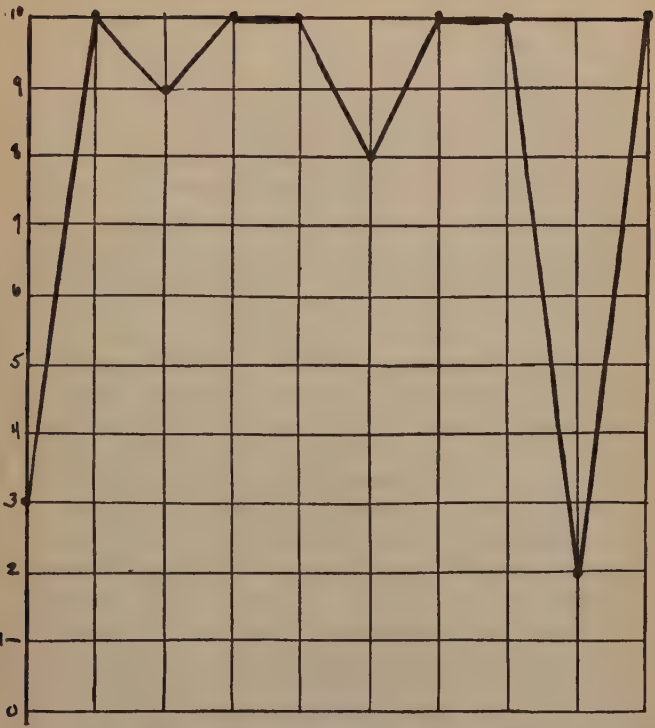
Coordination of impulses.
Care for detail.
Motor inhibition.
Resistance.
Assurance.
Motor impulsion.
Speed of decision.
Flexibility.
Freedom from inertia.
Speed of movement.

Fig. 15.

aggressive type: this graph was obtained from a young successful lawyer, particularly strong in court work. His explosive aggressiveness creates an impression of great force. A failure at times in dealing with people might be anticipated from the general pattern, although excessive aggressiveness is balanced by great flexibility."

Suggested Vocational Significance.—Downey suggests that testing of will-profile may give assistance in vocational adjustment as follows: "In giving boys and girls vocational as well as educational advice one should know much of their temperamental peculiarities. One needs above all to reckon with such things as aggressiveness, speed, interest in detail, perseveration. Large demands will be made upon the applied psychology of temperament when once it succeeds in establishing itself." . . . "Social judgments will in all probability continue to be affected by temperamental patterns. In school and college the ability of the quick-reacting, flexible, ready and suggestible child and youth will probably always be overestimated; in every-day life the speedy, aggressive individual will be overrated. Given the necessary equipment of native intelligence and training, the latter will more readily acquire prestige in such professions as law and medicine than will the obstructed man who is slow to react, critical in attitude, and conservative in judgment."

Investigation of Actual Vocational Workers Necessary.—Reasoning *a priori,* one is inclined to believe that these things are true. In the scientific vocational adjustment that we have accepted as our ideal, however, we cannot jump to conclusions. There is one difficulty that we have already referred to, namely, the difficulty of assuming that there are general traits like industriousness, aggressiveness, and the like, which can be measured and which express themselves equally pronouncedly in all the activities of the individual. It may be that there is enough generality about them so that for practical purposes we may speak of them in general terms. But our present point is that this cannot be accepted as a fact until it is scientifically proven.

The second fallacy is in assuming that precisely these traits are those called for in certain specific vocations. Again,

perhaps they are. We cannot assert it, however, until we have measured a number of workers in different vocations and have discovered that successful lawyers, for example, stand higher with respect to the trait designated 'aggressiveness' than do unsuccessful lawyers, or persons in a vocation said to call for lack of aggressiveness.

One way in which the Downey test has been applied in vocational adjustment is described by Ream. He tested 75 men (students in a course in salesmanship). He then selected three who, according to the tests, were classifiable as 'mobile,' 'rapid-fire'; and three who were classifiable as 'deliberate.' He presented the names of these six men to each of the 75 salesmen with the following instructions: "Suppose you were first assistant to an agency manager and you needed three men to come into the office from field selling to help you with your work. Which three of the following list of six men would you choose? Do not consider their ability as salesmen but choose the ones whom you would prefer to have working at desks next to yours week after week. Mark with a check your three choices." (11) On casting up results, the investigator found that those salesmen, who, according to the tests, fell into the 'mobile' type chose the three mobile men to be associated with them. "The 'rapid-fire' man wants fast people to assist him." Those who, according to the tests, were of the deliberate type, chose the three deliberate men and the three mobile men with about equal frequency.

No one, not even their inventor, claims that the Downey tests are a perfect instrument with which to measure the volitional factors in vocational adjustment. They furnish a starting-point, however, and will undoubtedly be followed by many other attempts, all of which should be encouraged so long as they conform to the principle of applying rigid scientific technique in actual working conditions.

Other Factors in Personality.—A more all-round scientific survey of the personality has been attempted by Allport and Allport, who divide personality into four large groups of factors: Intelligence, temperament, self-expression, sociality. These were subclassified and each class was tested in a sample investigation with 55 subjects. The method employed is too elaborate,

and the results are too tentative, to be described here. The interested reader may refer to the published report (to which is appended an excellent bibliography of the work done on the testing of factors in personality). (2) Suffice it to say, efforts are being made to measure the more elusive factors of personality, and as they are refined, they may be applied to the perplexing problems of vocational adjustment. (14)

Tests Calling Forth Specific Rather than General Reactions.—In order to overcome the objection inherent in all attempts to find indices of general volitional traits, another method of testing the volitional aspect of an individual has been employed by Voelker. He devised specific situations calling for decision and action on the part of the subject, and measured the reactions. For example: he tried to find out whether an individual could be "trusted to deliver a letter and to see that a reply is mailed within 24 hours if he promises to do so. Can he be trusted not to read the letter if the envelope is left unsealed?" The subject was handed an actual letter unsealed, accompanied by certain instructions, and his conduct was measured. Since the specific problem this investigator was interested in was that of measuring the extent to which these volitional activities are subject to training, many of his conclusions are not pertinent to the present discussion. The investigation is cited, however, because it recognizes the specific nature of volitional traits and seeks to measure them in specific form rather than as general abstract entities. (13)

Emotional Factors in Vocational Adjustment.—Passing from the volitional, we shall consider another aspect that may be of great importance in affecting the successfulness of a worker's adjustment to his work; that is the emotional. We cannot hope to show all the relationships between emotion and vocational adjustment. For purposes of exposition, however, we shall briefly discuss some of them. One of the most prominent is temperamental instability. There are in all vocations a number of persons who are temperamentally unstable. Just how numerous they are has not been determined. Every experienced factory foreman will agree, however, that they are present, perhaps in the number of five or ten in every hundred. They range over

a wide scale, from persons who definitely go insane, so that they have to be assigned to a hospital, to mild cases that are hardly distinguishable from their normal fellow workmen.(9)

Forms of Emotional Instability.—The forms that their instability takes are varied. One interesting form is that technically known as paranoia. A paranoiac is a person who has the firm conviction that some one is trying to injure him: poison his food, get his job, intercept his letters, or spread slanderous remarks about him. Sometimes these obsessions are so mild as to arouse only amused comment on the part of fellow workers. Always, however, they are uncomfortable to the worker and sometimes vocationally incapacitating. The author recalls one case that illustrates this. A young man developed the idea that he was followed about by voices which uttered unseemly statements about his character. He had a position as collector for an association of lawyers and was obliged to ride the street-cars and elevated railway a good deal. He said that no sooner did he enter a car than the voices would begin and rise to great intensity in the effort to make themselves heard above the noise of the car wheels. They were so loud that of course all the other passengers could hear them. And the remarks were so scurrilous in their nature that he could not endure riding farther but always had to get off at the next stop. Under such circumstances, he naturally could not do the work of a collector. Indeed he could not do any work at all that required him to mix with people.

Another way in which a mild form of paranoia may affect one's vocational adjustment is illustrated by those persons in industry who imagine that the management is constantly trying to grind them down. So common is this feeling that one is inclined to conclude that probably a large proportion of workers have a mild case of paranoia. Although such a sweeping conclusion can hardly be accepted, it is reasonable to believe that many of the radical agitators in labor circles should be considered as victims of emotional disturbance.

Another common emotional disturbance that may be deterrent to successful vocational adjustment is melancholia. "There

is some suggestion of a parallel in the mental attitude of the revolutionary and that of the confirmed melancholic. The confirmed melancholic, particularly of the more advanced years, is apt to centre thought upon certain ideas, which in frank cases of mental disease may amount to delusions." (12) Other abnormalities are present which cannot be so easily classified. Workers abound who are called by their fellows eccentrics, disturbers, queer guys, querulous persons, sullen, irritable, roving, malicious. Ball, after making observations in a factory where two months afterward a strike occurred, is reported to have found that according to the records every one of the strikers had something wrong with him from a nervous or mental standpoint. Of course, one cannot conclude from this case that all strikers are psychopaths, but there is great likelihood that some of them are mentally touched. (7)

Need for Industrial Psychiatrists.—Such reflections make one conclude that a good deal of the maladjustment in industry is traceable to emotional disturbances. The antagonism between labor and capital may have as its basis the abnormal emotional strains of a few leaders. And the unhappiness of many workers may be due to emotional twists which hinder their easy adjustment to certain kinds of work. For the amelioration of such conditions it is becoming increasingly clear that an effective scheme of vocational adjustment will demand the services of experts in psychiatry. By psychiatry is meant, "the name ordinarily given to the practical branch of medicine that deals with the diagnosis and treatment of mental diseases." Psychiatrists who address themselves to the diagnosis and alleviation of such ills as those just described find that some of the causes are grounded in past experiences of the maladjusted workers which have so impressed themselves as to have affected all their later attitudes. With some cases the treatment consists largely in reëducating the worker so that he will not fear the objects that now cause him discomfort; and the arrangement of conditions that will not irritate his too sensitive spirit. Vocational psychiatry may be expected to assist in the solution of "grievance problems, particularly if by the term 'grievance' be under-

stood to mean also all sorts of minor dissatisfactions in plant management. Industrial psychiatry is likely to be of especial value, it would seem, on some sides of the analysis of turnover. Practical experience in getting jobs for the mentally handicapped unemployed seems to indicate that industrial psychiatry will be of special value in job selecting for certain psychopathic or cranky or 'different' employees, whom it may be extremely desirable to retain in service." (8)

Possible Influence of Glandular Secretions.—Another way of explaining these emotional disturbances is by reference to secretions of certain glands which at present we do not know much about. It is well known that there are in the body certain glands that manufacture substances of great importance. For example, the thyroid gland, located in the neck, manufactures a substance that is necessary for bodily growth and for the normal development of intelligence. In case this gland does not produce enough substance the individual is stunted in growth, reaching a height perhaps of only three feet. Other symptoms are present, such as wrinkled skin, coarse hair, and, most interesting of all from the standpoint of a psychologist, retarded intelligence. The patient, technically known as a cretin, may be a complete idiot, or not far above that. A treatment has been devised whereby he is fed extract of sheep's thyroid (in tabloid form) every day. Under this treatment a remarkable change takes place. The body grows several feet, the skin becomes more nearly human, the hair becomes finer, and the intelligence develops greatly. True, the patient rarely, if ever, becomes as intelligent as the normal individual, but he may learn to perform simple tasks, and even to do a limited amount of school work. There are other cases at the opposite extreme, where the thyroid gland is too active. This, too, gives rise to abnormal symptoms, the chief of which is great nervousness. Hyperthyroidism must be combated by a prescription looking toward curtailment of the activity of the gland. Either of these abnormalities may hinder the successful vocational adjustment of an individual.

The thyroid is not the only gland, however, that may be dis-

turbed and thus affect vocational adjustment. There are others, adrenal, pituitary, thymus, etc., all of which work automatically and beyond the control of the individual. Indeed, their work may perhaps best be described in chemical terms. It is generally believed, however, to be closely interrelated with the emotional life of the individual; if it is abnormal, either deficient in its action or super-active, the emotional life suffers, and of course, in so far as the vocational adjustment is affected by the emotions, it too suffers. A great many startling statements about the possibility of such relationships may be found in the several books on Endocrinology that have appeared recently. For example, Berman writes: "It has been observed that financiers of mark, like great musicians, are special pituitary types. Also, that the financiers are voracious meat eaters and the musicians inordinately fond of sweets. Differences in anterior and posterior predominances might account for this. . . It requires no superlative imagination to see that an adrenal poor subject does not belong upon a job that involves muscle stress over a long period, or indeed, fatiguing conditions of any sort. Nor that a thyroid poor individual is not the best choice for a position that demands a keen, alert body and mind. In the selection of executives, the nature and stamina of the pituitary will undoubtedly be taken very seriously in the near future . . . The study of the internal secretions, including blood and X-ray examinations, will surely assist the demand for a truly scientific estimate of constitution and character that can be relied upon in the classification and distribution of personnel." (3) Promising as such speculations appear, they cannot be accepted as bases for scientific vocational adjustment. Actual knowledge about the exact relationship between these glands and practical adjustments of life is exceedingly scant. Very much investigation must be done by scientists before reliable knowledge will be available. Until that time, the layman will do well not to jump to conclusions, though he should keep in mind that many cases of vocational maladjustment which at present are attributed to meanness or to causes that can be remedied by the the will of the worker, may probably be due to deep-seated deficiencies of constitution.

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CHAPTER XI

RECORDS AS AIDS IN VOCATIONAL ADJUSTMENT

Records Should be Related to Employees at Work.—In this book on the use of scientific methods in adjusting workers to their tasks, we have stressed heavily the measurement of the workers. And we have stressed the desirability of having units for the quantitative expression of these measures. We have seen that some investigators consider the most important measures to be test-measures. We have tried to show, however, that these measures are not really of the greatest service, since they are extraneous even extravagant materials. We have recommended instead the use of units that make up the activities of workers while at work. In reporting specific investigations of problems connected with vocational adjustment, we have cited many kinds of personnel data that are useful to keep. We shall now mention more of these and shall try to give unified treatment to the subject of records that may be useful in vocational adjustment.

In addition to recommending that numerous records be kept regarding employees we should add that the next thing is to make profitable use of them. This requires a department of personnel research. Just as modern industry has demonstrated the wisdom of installing departments of chemical and physical research by means of which new ways of using raw materials are discovered, so it must discern the value of psychological research on the human ingredients of industry. To do this requires the intensive study of each worker and of all the workers in a group. As has been said repeatedly in the foregoing chapters, we are not justified, at this stage of the development of scientific personnel work, in trying to use bizarre measures which will frighten and disturb workers to the detriment of their effciency and the demoralization of their organization, and so we shall not recommend that every employing establishment install a department of experimental psychology and equip it with elaborate apparatus. A large amount of knowl-

edge can be secured from materials already available. The chief requisites are a clear perception and formulation of the psychological problems of vocational adjustment, an appreciation of the practical difficulties confronting industrial managers, a willingness to adapt one's scientific methods to practical exigencies, skill in arranging conditions so that measurements can be made, patience in awaiting results, and caution in interpreting them.

Kind of Records.—While a complete list of items to be kept cannot be given here, a number may be mentioned which are usually obtainable and which, if properly utilized, will be of value in adjusting workers to their work:

Name.
Address, including telephone number.
Date of birth.
Height, weight, complexion.
Other physical data of a standard medical examination. Some of these should be for purposes of identification, others for the purpose of determining the exact physical condition of the worker at time of entering the employ of the firm. Items usually included in the standard medical examination are: normal pulse, breathing, blood-pressure, blood-count, visual and auditory acuity, diseases which the worker has had, etc.
Marital status.
Number of children.
Other dependents
Ownership of home—value of same.
Amount of rent paid. Number of rooms occupied.
Religious affiliation.
Lodge and other social affiliations.
Nature of investments, including amount of insurance carried.
Amount of schooling, perhaps subjects of greatest excellence.
Vocational history.
Answers to questions of trade test at time of interview.
Photograph.

The items mentioned above may all be secured at the time of the interview, without arousing any antagonism on the part of the applicant. In addition, as soon as the worker is accepted, records should begin that will give as complete a picture as possible of his work. These might consist of such facts as the following:

Amount of work produced.
Quality of work produced.
Speed, accuracy.
Number of absences, and times tardy.
Lay-offs.
Records of reprimands.
Records of suggestions made by the employee.
Accidents.
Dates of transfers and promotions; circumstances of each.
Bonus payments.
Ratings given by supervisors periodically.

(For longer list of items the reader is referred to Hitchcock (11), and Benge (1).) The uses to which these facts may be put are numerous and varied. They will grow more so as industrial managers see the value of keeping records and studying them as practical controls in vocational adjustment.

Records as Basis of Rewards.—One of the most obvious uses of records is as a basis for making rewards. Rewards usually take two forms, pay and promotion. How can one administer either of these justly without having accurate measures of the work of each worker? As soon as one keeps such measures, he discovers wide differences among workers. We have shown several examples of the nature and extent of these differences. While we cannot enter into a long discussion of methods of wage payment involving economic and ethical considerations beyond the scope of this book, we can point out the wisdom of giving rewards commensurate with the work done. It is evident that equal advancement cannot come to all workers. When an opening does occur, justice and managerial efficiency demand that the best employee be chosen. In making a decision as to who is the best, personnel records are by far the best indices.

Records as Basis for Evaluating Tests.—There is feverish desire on the part of modern business establishments to devise tests that will facilitate the selection of new employees. If this desire is ever to see fruition there must be installed accurate measures of efficiency. As was prescribed in Chapters Six and Seven, a test must first be tried out on a number of workers. The resulting measures must then be compared with the vocational activities of the workers in order to show how much relationship exists between success in the occupation and success in the test. Only if there be found a high degree of correspondence between these two can a test be accepted as suitable for the selection of workers. The utility of the test depends on the accuracy with which the vocational success has been measured. One who starts to measure this will encounter many difficulties. For example, what shall be the criterion of vocational success on the part of a retail salesperson? Amount of money taken in is not dependable, for that varies with departments. A salesperson in the furniture department might, in one sale of a bedroom suite, take in $500, while a person in notions might make 500 sales without reaching that amount. Nor is number of sales valid as a single criterion. For a salesperson in the rug department could not possibly have as many customers as a salesperson in the handkerchief department. Amounts of commission are unreliable for similar reasons. In selling outside a retail store, one item of information that gives some indication is the number of calls made; another is number of names turned in. But obviously no one of these could be used as a sole criterion of vocational success, nor even these collected, for there come other factors, such as absences, disposition and the like, which are important. In the face of all these obstacles, it is easily seen that to keep most elaborate records will not give absolutely accurate information regarding vocational success with which one can correlate test results or achieve any other ends of records to be described in this chapter. The procedure most often employed, and that which seems to be fairest, is to combine a number of these measures of efficiency, weighing each one justly, and using the resulting figure as an index of efficiency.

Records as Basis for Inciting Workers to Greater Productiveness.—One of the most interesting and economically important uses to which personnel records may be put is that of inciting workers to greater production. An excellent demonstration of this is reported by Wolf: (23)

"The basic principle of our philosophy is that a man must be interested in his work in order to get good results. If he is not interested, he will not do his best. He is simply in this case reacting to externally applied force or stimulation, and is doing his work more because he is compelled to do it, from fear of either losing his job or being penalized in some way. A man in this frame of mind cannot do his best work and will really do as little as possible. If the work is interesting, however, he works 'from within out,' as it were, because he *desires* to do so and not because some one is all the time 'following him up.'"

Wolf was led to inaugurate this method of using records by the fact that the paper going through the manufacturing machines varied in weight and in dryness. A ream should weigh exactly thirty-two pounds. "If the paper runs lighter than this, it is apt to cause breaks in the pressroom, and if it runs heavier, a publisher will not be able to get as many editions out of a ton, and his paper cost will increase in proportion. It is also true that if the paper is over-dried on the machine it becomes brittle, and therefore breaks easily in running over the printing-press. In addition, the dryness makes it impossible for the sheet to take a good finish and as a result the surface will 'fuzz up' and fine particles will come off on the type of the printing-presses and cause trouble, especially with the cuts, by filling up the fine corrugations or meshes. Therefore, the main problem is to make an absolutely uniform weight of paper, which has a good finish, and at the same time elasticity, without the objectionable fuzziness.

"We made up our minds. . . that the trouble was due largely to a lack of interest on the part of the men operating the machines in keeping the operating conditions where they should be to eliminate complaints, and that this lack of interest came largely from their lack of knowledge as to what the con-

ditions actually were; in other words, there were not enough samples taken of the sheet as it was operating on the machine to inform the machine crew of what was occurring." . . "Realizing that the problem was to produce a desire upon the part of the machine crew to get the results we were after, we put on to each shift, a man (one for every two machines) whose duty it is to take a sample every time a reel is changed (once in every 30 or 40 minutes), from the front, middle, and back of the sheet. These three samples are weighed and recorded as indicated on the form . . . reproduced herewith."

The charts were in two parts, one showing how closely the paper adhered to the proper weight (32 pounds), and the other showing how nearly it reached the proper moisture. Charts showing these records were posted on a bulletin board in the machine room. The men welcomed this objective demonstration of the quality of the work they were doing, and they set out earnestly to improve it with most gratifying results.

"The 'basic weight' and 'moisture test' records had only been operating a short time when the machine-tenders called our attention to the fact that they could get better results if the stock thickness or density furnished them by the beater room was more uniform. They asked us to find some way to measure the thickness of the stock so that the beater engineer could do his work more intelligently. As a result of this suggestion and after discussing the matter with the beater engineer, our research department has tackled the problem of measuring this stock thickness and it is now practically solved. The beater engineer immediately suggested to us that the variation in the stock thickness which was furnished him by the sulphite mill and groundwood pulp mill was not uniform, and that we should find some way of recording the thickness at these points. We found that to do this we had to increase the amount of agitation in the pulp storage tanks, and as a result are making some radical improvements which will tend to produce greater uniformity throughout the entire process.

"Of course, it goes without saying that this greater uniformity is bound to result not only in a better quality of paper, but in increased output as well; in fact, our Studgeon Falls mill, with-

out making any changes in the speed of the paper machines, has already increased its output over 5 per cent. as a consequence of more uniform operating conditions.

"Because of the interrelation of Quality, Quantity, and Economy records, any complete record of individual progress must, of course, take them all into account. However, as this is not always practical, we have at least one of three ways of measuring progress always open to us.

"The same principle of developing the individuality of each man was extended right up to the department heads, who have complete records, including cost sheets of the operations of their departments. We also developed a system of reports for the maintenance and construction crews by giving the men records showing the cost of jobs that they were working on, together with detailed figures of the cost of all the materials they were using. The saving, because of the creative power released, through the aid of these records, was enormous, and the fact that our men did this for us without being paid on a piece-work system, or a task or bonus plan, demonstrates, it seems to me, conclusively that men instinctively desire to do the right thing, and do not have to be bribed (as a workman once expressed it to me) to do good work."

TABLE XXV

Clerk No.	Pct. 1920	After 15 weeks	First 17 weeks 1923
1	85.0	97.6	111.6
2	78.6	96.4	103.0
3	90.0	96.0	104.0
4	77.5	94.1	90.1
5	82.4	93.7	99.5
6	77.5	92.3	87.3
7	75.0	88.5	
8	61.2	84.5	84.3
9	43.7	83.2	87.0
10	37.5	81.2	
11	35.6	80.0	65.8
12	12.5	77.6	94.2
13	72.5	76.7	88.0
14	42.5	74.8	
15	10.0	66.6	
16	18.8	62.2	
Average	56.3	83.8	92.3

Franklin reports similarly beneficial results. He kept records of daily individual output on a number of groups of workers, posting them so that the employees could see them. The clerical group responded as shown in Table XXV, where it is seen that the clerks increased their efficiency by practically 50 per cent. the first fifteen weeks and a substantial amount at the end of the next period of measurement. (8)

Similar records kept of the productiveness of the workers in the factory, loaders of thrasher (it was a paper mill), dumpers of beaters, etc., when posted in the workrooms, brought no marked increase in efficiency, but when to the posted records was added a system of bonus payment, marked improvement was registered, which leads Franklin to conclude that his clerical workers could be incited to greater productiveness by means of posted records alone, but the factory workers, while encouraged somewhat by such records, required the application of a bonus as well.

Records as Incentive to Learning.—In the preceding pages we may have given the impression that records of progress incite workers to work more rapidly and accurately by the exertion merely of greater voluntary effort. As a matter of fact the improvement is probably brought about more often because the workers *learn to do their jobs better.* The record of progress or any other form of incentive may be simply the stimulus that is causing them to develop more improved methods. The investigation of the work of compositors, described in Chapter Nine, indicated such a source of improvement. It is, therefore, as an incentive to learning of better methods of work that records of production may be profitably employed.

Gerber reports effective use of Gantt charts for locating weak men. After instructing was begun, the production rose in three months from 42 to 90 per cent. The increase was accomplished by learning, not by increased expenditure of effort. (9) For further quantitative demonstration of the importance of records as incentives to learning, the reader is urged to study the report by Clark. (5)

Records as Means of Locating Leaks in Management.—

Probably the greatest service rendered by personnel departments in the days of their first popularity was to show managers the economic wastes involved in labor turnover. Many persons still think that the chief duty of a personnel department is to figure turnover and the costs involved in it. Experience is showing, however, that the department occupies a much more important place; can lay its finger on many leaks in management; and can assist the production department in a variety of ways. For example, statistics gathered in one shop gave grounds for concluding that the factor of absenteeism was lowering the efficiency of the shop to 91 per cent. (1) Another personnel manager, after such an investigation, was able in six months to reduce the percentage of time lost in a concern employing 1700 men from 5.90 to 3.82. Some of the devices he used were: make a copy of the attendance record and post it on the bulletin board; post the names of men with perfect records; write letters to foremen commending them and their men. (18)

On discovery of the fact that the number of people hired on Monday was greater by two or three hundred per cent. than the number hired on other days, one firm adopted the policy of employing only on Monday, and so leaving the other days of the week free for the necessary clerical work of the personnel department.

Facts about Absenteeism as Examples of Data Secured Through Records.—Among other facts that such records may reveal are the number of absences in one department as compared with the number in another. For example, "in a manufacturing plant having twenty-four departments, the maximum

TABLE XXVI

Percentage of Absenteeism Among Men and Women

Nature of business	Year	Male	Female
Manufacturing	1919	4.52	5.75
War materials	1918	10.09	18.40
Shell factory	1918	5.30	7.80
Rubber factory	1919	4.52	8.06
Rubber factory	1920	4.32	7.55
Average		5.75	9.51

absence was 36.22 days per employee per year in one department as compared with 5.78 in another. Another group of figures showed an attendance of 98 per cent. in the tool shop as compared with 70 per cent. in the sales department." Or, the absences may be classified according to men or women. The following table containing figures from a number of establish-

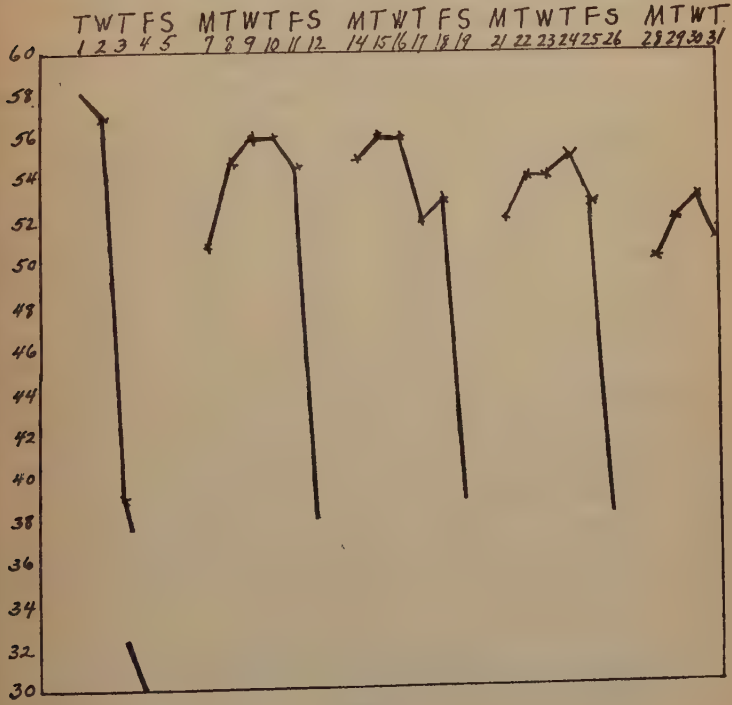

FIG. 16.

ments for several years shows a preponderance of absences among women. The average of per cents for men is 5.7, that for women, 9.5. If such a condition is typical of the individual establishments, it gives a partial measure of the value of women, as compared with men, in this respect.

Equally interesting figures may be compiled showing the relation between absenteeism and age. This is illustrated by figures from Hackett, showing data on 6748 workers. Table XXVII (fifth column) shows that the age period from 15 to 34 is the period when absences are most numerous, with a decrease from year to year as age increases. (10)

Days of the week on which absences were most numerous are shown by records represented in Figure 16. (1)

TABLE XXVII

Relation between Absenteeism and Age

Employees		Days lost per employee per year			
Age periods	No. of employees	Per cent.	Aver. No. days lost	Per cent.	Total number days lost
All ages ..	6,748	100.00	5.36	100.00	36,171
35–44	1,170	17.34	5.31	17.17	6,213
25–34	2,318	35.35	4.95	31.68	11,463
35–44	1,170	17.34	5.31	17.17	6,213
45–54	593	8.80	5.16	8.42	3,059
55–64	194	2.87	10.37	5.65	2,013
65 and over	52	0.76	14.38	2.04	748

Records as Basis of Job Analysis of Personnel Director.—In this connection might be cited figures gathered from records which give a certain kind of information about the work of the personnel department. When, for example, is the work of the department heaviest? Records of the days of the week and the hours of the day on which applications came in are shown in Tables XXVIII and XXIX. (22)

TABLE XXVIII

Showing Days of Week on which Applications Came In

	No. of days in month (June, '19)	No. of applications	Daily aver.	No. of days in mo. (Oct., '19)	Daily average
Mondays	5	148	30	108	27
Tuesdays	4	71	18	88	22
Wednesdays	4	186	22	107	21
Thursdays	4	56	14	95	19
Fridays	4	57	14	64	13
Saturdays ½ da...	5	15	3	19	5

TABLE XXIX

Showing Number of Applications Grouped According to Hour of Day

	June	October
7:28 to 10:00 A.M.	206	202
10:00 to noon	107	101
12:55 to 3:00 P.M.	80	70
3:00 to 4:55 P.M.	40	101*

*Explained as due to campaign on part of high-school boys who applied after school hours.

There are many convenient forms for the keeping of such records. A form highly recommended by one personnel executive is given below. (20)

Name			Dept. and Roll No. BA 486 BF 342	
John Smith		Date	8/14/19	11/25/19
Age 32	2 yrs. service	8/14/21		Years service 1921

Pay period ending	Rate per hour	Occupation	Paid off	Std. hours	Premium hours	Day work hours	Wages rec'd	Bonus rec'd	Days Abs't	Times tardy
1–15–20				182.3	90.2	9.4	81.30		1	
1–31–20		J & L		168.9	89.4	7.8	80.42		2½	
2–15–20				194.2	103.1	2.6	84.63			
Total							$1,692.17			

With this or a similar kind of record card one can tell quickly "just how much any production man was earning, how much premium or piece work he did, how much day work and its value in dollars and cents." Of course, its most obvious value consists in the information it contains as to what the men are earning and how regular they are in attendance, which were the first things the firm in question wanted to know. In addition, however, this particular plant soon found that the figures representing the standard hours assigned, the premium hours worked, and the money for the same could well be used to determine a man's productive ability as compared with that of other employees on similar work. By noting also the time lost through tardiness and absence and the reasons for the same, an excellent foundation was obtained for making transfers of employees from

one job or department to another, and also for changes in various wage rates. In these cases the foremen are consulted, as no set of figures is complete without this personal element.

"It is especially helpful in adjusting earnings on similar work between piece workers and day workers. For instance, in the service department there was discontent over the day rate given a certain group who had found out that another group on similar work was paid a premium rate which brought their total earnings several dollars higher every pay day. Thereupon, the service records showing the working history of the two groups were taken from the files and compared, and sure enough, it was found that the day workers were paid considerably less money than the production group. The hourly rates, therefore, were at once changed to more nearly correspond with the relative value of the work done. At such times, too, as a general increase or decrease is being contemplated in employee earnings, by means of the card the total or average earnings per individual are easy to compare with the so-called living wage.

"Perhaps as easy a way as any to make clear the monetary value of the service record is in connection with income tax data". . . . . "With the data on employee record cards posted up to November, it was found an easy matter to borrow two or three operators from the accounting offices early in January and simply add up the totals on the yearly cards. The result was that by February there were 25,000 cards all ready and the return slips all filled in soon after. Now, ordinarily, this totaling and making of returns is the work of the accounting or time office, but through the card system of which this one by-product of quickly obtained income-tax data was profitable enough to nearly pay for its yearly maintenance, the employment office inadvertently became the hero of the occasion. Unconsciously, too, it established a precedent in this field, for now most large plants have individual income-tax record cards on which are placed the periodical earnings of the employees.

"Bonus payments based on regular earnings have been easily computed from the same basis figures, as have also been soldier pensions in some instances when these have been brought in for attention. Court inquiries, and welfare cases often call for the use

of these cards in the consideration of earnings and attendance." . . . "Through the periodical study given these records in all shop departments numerous injustices have been corrected where steady and faithful employees have been overlooked when their less contented and less deserving neighbors were crying for raises and getting them. In this way, many parasites were found, too . . . All in all, this little card system as tried out in the organization in question has done much to develop and maintain a sturdy spirit of friendliness between shop workers, their foremen, and the firm. For the record is square and truthful, containing, as it does, proof of the workman's actual performance, and is open for his inspection at all times. Therefore, the employee must believe in it. He does believe in it, and because of this fact, the writer calls this card game one of few where the employment or factory manager can really lay his cards open on the table and permit them to show the company policy toward its employees."

Guidance in Formulating Personnel Policies.—As employers are becoming enlightened regarding the technique of adjusting people to their work they are beginning to formulate definite policies by which to proceed; policies determined not on opinion and prejudice, but on the strength of scientifically gathered information. The only way they can gather such information is through a system of personnel record-keeping. For example, one firm discovered the value of its reputation for fair dealing by means of keeping records of the reasons given by applicants seeking positions with it. "We have recently been classifying our applications," writes Wolf, "and a study of the results for two months has shown us that more people applied to us for work because of the excellent reputation the plant enjoyed than for any other reason." . . . "In June the second largest reason given for applying at our plant was from 114 people who were actually job-hunting, and who replied to our question 'why?' that they were simply 'passing by' and stopped in. Third on this list was another bunch of people who might be—and in most cases should be—classified in our 'good-will' assets, as it was composed of former employees, who, of course, had actually experienced our working conditions, and

who knew the 'inside stuff of the shop.' Consider the question of industrial 'good-will' from another angle. Are people really anxious to work for you and how many times (repeat calls, a salesman might say) would they call on you in an effort to get into your organization? A glance at the tabulated figures secured would indicate that some people were either desperately in need of a job, or wanted to connect with our organization mighty bad." (22)

TABLE XXX

Showing Number of Times Applications Were Filed

	June	October
First	306	367
Second	110	91
Third	15	14
Fourth	2	2
Fifth		4
Sixth		2
Seventh		1
No record secured	97	56

Of the 481 applications filed during October, on which reasons for applying appear, 114, or 24 per cent., were filed a second, third, or even seventh time, surely giving evidence of the good reputation which this firm enjoys among workers. The management determined, therefore, that it would stress this as one of the leading attractions of employment.

In another firm "the question had often been raised as to the desirability of re-employing old hands where previous records were acceptable. Analysis of records as pictured in Figure 17 shows that in hiring such men one should avoid those who stayed only a year, and should instead make a selection from those who had stayed more than one year. (2)

This same firm, in formulating a policy regarding the hiring of single men or married men, studied the stability of employees classified according to their marital status, and on discovering conditions as pictured in Figure 18, adopted the policy of hiring married men whenever possible.

Similar studies can assist the management in determining who should be preferred for certain jobs, how much weight shall be placed on previous experience, how much education is desirable. For illustration of this latter point figures will be cited

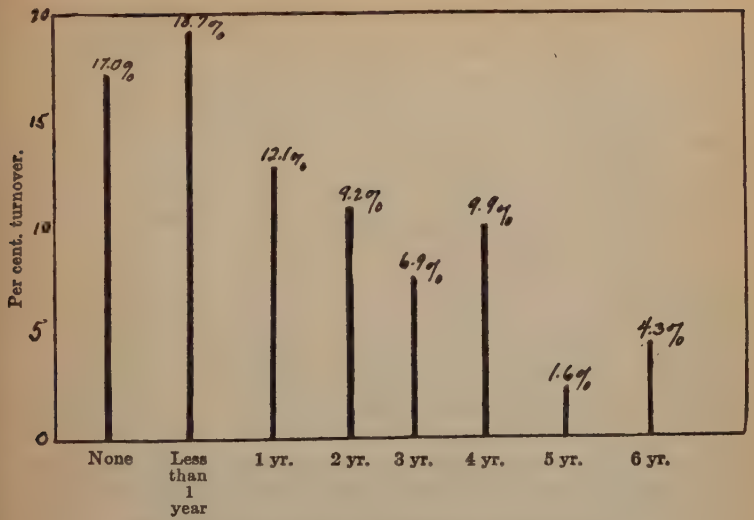

FIG. 17.—Voluntary quits according to length of service.

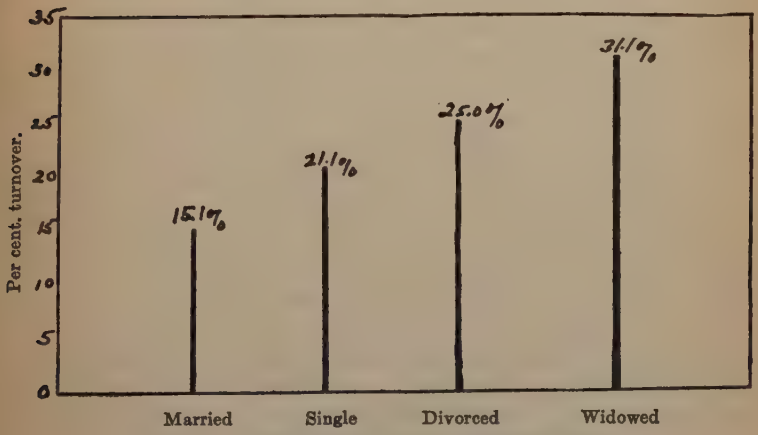

FIG. 18.—Voluntary quits according to marital states.

which were kindly furnished the author by Miss Lena Casey and Mr. Philip Burnet, who studied the records of the star salesmen of 95 insurance companies and established the fact that a college education is an asset to one who aspires to be a star insurance salesman. In terms of per cents of production, those with a common-school education produced on the average, 56; high-school, 90; and college, 124. This in spite of the fact that the members of the first group had had 12 years of experience, those of the second, 11; and those of the third, 9 years.

Value of 'Qualification' Records.—In a factory where there is much intermittent work in certain departments, and consequently much temporary laying off, considerable help in adjusting workers can be derived from a system of record-keeping that preserves a record of the different jobs in the establishment that each worker is qualified to fill. In a tailoring establishment, for example, there are usually a number of workers who could work in several departments, the button-hole shop, sleeve shop, cutting shop, etc. If, by reason of slackness of orders, one of these workers is laid off from one department, he might profitably be transferred to another department, where workers are needed. The mechanism through which such transfer can be effected is the 'qualification' card. On the card for each employee can be placed tabs, red indicating experience in one department, yellow in another, blue, another, etc. Search for an experienced button-hole maker consists simply in running through the files for tabs of a certain color.

Or a card-sorting system might be used similar to that used by the United States Government in taking the census. The use of this in a personnel department is described by Benge: "Cards are prepared showing merely 45 columns of figures. Facts are recorded by use of a punching machine which punches a hole through the number desired. For instance, if a man's check number were 23048, holes would be punched through these numbers in the proper columns . . . When it is desired to sort the cards the entire pack is placed in a machine which automatically sorts them, one column at a time, for any particular fact. For instance, if it is desired to find the cards of all men who were hired, the cards would be sorted by the two columns under

the word 'Year.' The cards would then be found in the proper pocket." (3)

For descriptions of elaborate mechanical aids to personnel record-keeping, the reader is referred to Benge, (3) Hitchcock, (11) and Scott and Clothier.

Follow-up Work in Vocational Guidance Bureaus.—The foregoing uses of personnel records relate chiefly to employing establishments like factories and stores. There are other agencies that will find important uses for such records. In particular should be mentioned vocational guidance bureaus, whether conducted privately or in connection with public agencies like schools. The chief use that may be made of records in these bureaus at present is in connection with research. The art of advising people regarding vocational choice is not very highly developed. Our ignorance of the correct procedure has been frankly acknowledged throughout this book. In order to advance from this stage of ignorance much research is required. Vocational counsel must be given to individuals; their choices must be recorded; then their progress along the lines of their choice must be charted. After records have accumulated over a considerable period of time, compilations can be made showing how far the advice that was given has been accompanied by success. Records are particularly necessary in the administration of scholarships, which are now coming to occupy such an important place in vocational guidance. Only by such a system of checking up tentative practice can we arrive at a rational procedure in administrating vocational guidance. Excellent guides for the keeping of such records in vocational guidance bureaus will be found in the *Vocational Guidance Bulletin* of the Pittsburgh Public Schools. (15)

Summary.—In this chapter we have declared that one of the most vital factors in a rational system of vocational adjustment is record-keeping. We have indicated the kinds of facts about workers that should be tabulated and the uses to which they may be put. Among the most important are: as basis of rewards, such as wages and promotions, as basis for evaluating tests, for inciting workers to greater productiveness and to the development of greater skill; as means of locating leaks in management; and

as basis of formulating personnel policies. Numerous examples of these uses of records were cited, showing that they constitute not merely a theoretical desideratum, but a practical component of effective vocational adjustment.

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CHAPTER XII

RATING AS AN AID IN VOCATIONAL ADJUSTMENT

Desirability of Quantitative Measures.—Throughout our study of the worker and his work, we have maintained that the ideal of science is measurement. We might qualify this further by stipulating that we prefer objective measurement. By this is meant measurement that is unmistakably correct, unequivocal, and verifiable by several persons. With some kinds of work this goal is attainable. One can easily measure the number of pairs of shoes made in a day, the number of pairs of uppers cut out, etc. Measurement in such instances is relatively easy. There are many kinds of work, however, that cannot so easily be measured in objective terms. How, for example, can one measure directly the output of the head stenographer of a corps of one hundred, or that of the superintendent of a glass factory, or that of the superintendent of a city school system? In order to meet the demands of such situations methods have been developing which permit subjective ratings to be made. The theory is, when objective signs are lacking, seek a measure of the worker in the minds of persons who know him. Call for estimations (they are usually called ratings), in terms of amount, regarding those parts of his personality that are under consideration.

Use of Ratings Under Several Circumstances.—The attempts to make these ratings have varied according to several sets of circumstances. They are used for measuring the value of workers in factories, offices, and banks. They are used in schools for the estimation of the ability and performance of the children. They are even used in measuring the efficiency of the teachers. For our purposes we shall first consider rating methods as they are used by an employer in rating the workers in his establishment.

Twofold Grouping Most Simple.—Probably the most simple way of rating is to make two groups—good and not good. The worker is rated 'satisfactory' or 'not satisfactory,' 'good' or 'poor.' This method may have uses, but it is rough and it cannot lay claim to being very scientific.

Threefold Division Preferable.—A more complicated method is to make more than two divisions. One can make three, that is rate the employees, A, B, and C; or four, rating them A, B, C, and D; or five, rating them A, B, C, D, E. In such cases numerical values are assigned: A = 1; B = 2, etc. Of all such groupings, the threefold is probably the best to use in a practical situation. Four is to be condemned for the following reasons: In every group of human beings there is likely to be quite a wide distribution in respect to any trait. For example, among typists, there are bound to be great differences in speed. The fastest can write probably 100 single-page letters a day, while the slowest might write but 30. Actual measures showing such differences among compositors are shown on page 18. Figures on page 56 show the extent of differences among salesmen. In all such circumstances it is seen that there is a characteristic distribution of individuals. There are a small number of very poor, about the same number of very good, but a very large num- of mediocre workers. If their positions on the scale of excellence were shown graphically they would conform to the curve of probability as shown on page 102. To make a fourfold division of the workers, would require that one draw a line in the middle. This would be hard to do, for most of the individuals are at the middle. Furthermore, among those in this middle group the differences are smaller than between those of any other group. To judge whether one person should be in group B, or in group C might require finer discrimination than could be humanly made. Moreover, many persons at this middle group might easily be of equal standing. For these reasons, it is recommended that when the group method of rating is employed there be a threefold or a fivefold division, at any rate a division that will bring the largest group in the middle.

Groupings such as those just described are too rough for

some uses, and attempts have been made to devise methods that will allow more minute divisions on the scale and more exact ratings of individuals.

Rank Order Method.—One method calls for the ranking of the individuals in order, 1, 2, 3, etc., with the one who possesses the ability to the highest degree placed first, the next, second and so forth to the last. In ranking a number of persons one may begin at either end; he may call the 'best' individual Number One, then select the next best, etc., to the 'poorest'; or, he may begin with the 'poorest,' and so forth, ending with the 'best.'

Method of Paired Comparison.—A method of rating that is considered to be somewhat more exact, though more complicated, goes under the name 'paired comparison.' Each individual is considered in comparison with every other individual in the group. And by an ingenious arrangement, every one is compared with each of his fellows twice. In carrying out this method, a chart is prepared similar to that shown below. All

Individuals	A	B	C	D	E	F	G	H	Total x	Final rank
A			X		X					
B	X		X							
C				X	X					
D										
E										
F										
G										
H										

FIG. 19

the individuals—designated A, B, C, etc.—are arranged vertically along a line that is statistically known as the ordinate, and also horizontally along a line that is technically known as the abscissa. The rater then starts with individual A, and compares him

with individual B. If A is better than B, the rater marks a cross in the horizontal column; if A is better than C, he marks a cross; if A is inferior to C, he leaves the space blank; if inferior to D, he leaves a blank. After thus considering A with everybody in the group, the rater takes individual B, and compares him with every one else in the group, marking an X in the space where B is superior, and leaving the space blank if B is inferior. After thus comparing them all, which, it will be seen, means a dual comparison for each individual, the rater counts up the crosses that each one has, and rates that person as 'best' who has the greatest number of crosses; next best, with the next greatest number; and so on. This method has the obvious advantage of allowing each person to be considered twice, thus probably making the judgment more accurate. It has the disadvantage, however, of being somewhat more cumbersome than a simple rank-order method. It is especially laborious when one has a large number of people (say 50) to rate.

Combining Ratings.—It is an important principle that ratings should be made by as large a number of persons as practicable. In an office, for example, where a number of stenographers are to be rated, it is usually desirable to have the ratings made by the head stenographer, the office manager, and perhaps another executive. All these ratings are then combined. Another situation where several ratings must be combined is that in which a rating made at one time is to be combined with ratings made at other times. We may illustrate the method of combining ratings by showing a hypothetical group of stenographers who have been rated by three raters; the head stenographer, X; the office manager, Y; and another executive, Z. (See Table XXXI.) Stenographer A was rated first by two raters, X and Y; second by the third rater, Z; total, four points. Stenographer B was rated second by two raters, X and Y; and first by the third; total, five points. The average ratings should next be computed. Dividing 4 by 3 (the number of raters) gives 1.33; dividing 5 by 3 gives 1.67. Accordingly stenographer A stands first in final rank, and stenographer B second. It may happen that several persons receive the same rank. This should not be considered a weakness in the method. These persons may

be equal in ability. Such cases are especially likely to be found in the medium ranges of ability, for there are more people of medium ability than there are of very high or very low ability. In such cases the final ranking is handled as shown in Table XXXI. Those having the same average number of points are all given the same rank—the midmost rank among the

TABLE XXXI

Stenographers	X	X's dev. from av.	Y	Z	Z's dev. from av.	Sum	Average	Final rank	Percentile rank
A	1	.33	1	2	.67	4	1.33	1	100
B	2	.33	2	1	.67	5	1.67	2	95
C	5	1.00	4	3	1.00	12	4.00	4	85
D	3	1.33	3	5	.67	11	3.67	3	90
E	7	1.00	10	7	1.00	24	8.00	8	65
F	8	.00	7	9	1.00	24	8.00	8	65
G	4	.67	6	4	.67	14	4.67	5	80
H	6	1.00	9	6	1.00	21	7.00	6	75
I	10	1.33	8	8	.67	26	8.67	10	55
J	9	1.00	5	10	2.00	24	8.00	8	65
K	12	1.00	11	16	3.00	39	13.00	13	40
L	11	1.33	12	14	1.67	37	12.33	11	50
M	15	.67	15	13	1.33	43	14.33	14.5	32.5
N	14	1.33	13	11	1.67	38	12.67	12	45
O	17	2.67	14	12	2.33	43	14.33	14.5	32.5
P	13	2.00	17	15	.00	45	15.00	16	25
Q	16	.33	16	17	.67	49	16.33	17	20
R	18	.67	19	19	.33	56	18.67	18	15
S	20	.67	20	18	1.33	58	19.33	20	5
T	19	.00	18	20	1.00	57	19.00	19	10
	20)18.66			20)22.68					
	0.93			1.13					

number receiving the same number of points. Thus, stenographers E, F, and J, who received an average number of points of eight, should all receive the same final rank—eight. M and O, who received the same number of points, should receive the same final rank—that midway between them—14.5.

The rankings may be expressed in terms of percentiles. The best may be considered at the 100 per cent. point and the poorest at the one per cent. point, with the rest distributed *pro rata* as shown in Table XXXI. Since there are only 20 cases here, only the five-percentile points can be indicated.

Reliability of Raters May be Statistically Determined.—As would be expected, the ratings given by several persons are almost certain to vary. This comes from several causes. The raters are unequally acquainted with the persons being rated. One rater may value certain traits highly, while another one may place different emphasis on these traits. Statistical method requires that we accept the average of the ratings as indicative of the true standing of each individual. If so, the amount by which each rater deviates from this average in all the ratings he makes may be used as a measure of his reliability. Thus in the ratings given in Table XXXI, rater Z deviated from the average in his ratings by 1.13; whereas X deviated by only .93, which would make him appear as probably the more reliable of the two.

Disadvantage of the Method of Rank Order and the Method of Paired Comparisons.—The two methods just described have one weakness; while providing a serial arrangement of the persons rated, and indicating that A is better than B, they do not say by how much. In other words, while designating steps of superiority and inferiority, they do not indicate the distances between steps. So far as the figures go, the steps are considered to be equal. It is conceivable that they might possibly be equal, but it is hardly probable. From what is known about the distribution of human abilities, it is most likely that the steps at the ends of a scale are much larger than those at the middle portion of the scale. That is, the distances between A and B and between S and T are greater than those between I and J or K and L.

Objections to all Subjective Ratings.—In addition to these objections, which are peculiar to the methods just described, there are objections that have been brought against all subjective ratings, and since it is well to view all sides of a question we shall consider these objections. Some of them we shall admit frankly to be unsurmountable. Others we shall rule out as being offset by some advantage.

Prejudice on Part of Raters.—One of the first objections to the possibility of securing scientifically valid ratings on workers

is that those who are doing the rating may be prejudiced either for or against one or more of the workers.

Momentary Ill-feeling.—Another is that the one who is rating may be ill, or may have had a poor cup of coffee for breakfast, and may thus have his judgment clouded for the moment.

Unequal Acquaintance with Workers.—Again it is probable that an executive who would be asked to rate a group of employees would know some of them better than others. Furthermore, if there are several raters, one rater would know the employees better than another rater would. These three objections are not entirely unsurmountable. They may be partially overcome by the statistical methods described above; selection of competent raters, instructing them, using as large a number as is practicable, and combining ratings.

Tendency to be Affected by Some Single Outstanding Superiority.—Another objection is that there is a tendency in forming estimates about persons, to consider some outstanding trait and, because the individual possesses this in extreme degree, to judge that he is correspondingly superior in all traits. (10)

Different Bases of Rating Employed by Different Raters.—Raters cannot help being influenced by their diverse experiences. As a result, one person will stress one trait as important, while another will stress another trait. In the example given above, the Head Stenographer, X, might rate stenographer A first, because she is exceedingly accurate; Z might rate her first, because she is exceedingly rapid; Y, however, who regards punctuality as a prime virtue in an employee, might rate her lower because, though she is a good stenographer, still she is frequently late in coming to work; accordingly he rates her second and places in the first position stenographer B, who, though a little inferior to A in accuracy and speed, is still more punctual.

Difficulty of Abstracting.—This situation brings out one of the chief weaknesses in rating by whatever method. It is the difficulty of neglecting extraneous and inconsequential matters and focussing attention on one factor in a situation. A rater usually ought to rate with respect to some one thing, ability as a stenographer, not looks, nor character, nor education (though of course all these things may influence one's total stenographic

ability). To stand off, however, and abstract (draw off) one single factor from a complex situation is a difficult thing to do.

Pearson Method.—The presence of these difficulties has been recognized by psychologists, who have endeavored to develop improved methods. One aim has been to provide a scale on which the steps are equal or, at any rate, known. Another aim has been to define carefully the traits being rated, so as to do away with ambiguities and divergencies of interpretation. A scale that goes a long way toward incorporating these improvements has been devised by Pearson for use in rating the intelligence of persons. His method is described at length in *Biometrika* (6), but lest the files of that journal be inaccessible to some readers a summary will be given. The scale consists of a number of classes or degrees of intelligence, which were defined by Pearson substantially as shown in the instructions below. On the basis of this classification a number of headmasters and teachers in English schools were requested to rate their pupils in intelligence. The persons rated included children in grammar school, and students in Oxford and Cambridge, totalling about 5000. Assuming that the distribution of intelligence follows the curve of probability, Pearson plotted the estimations thus made along this curve; found the numerical value for each class by determining the point on the scale corresponding to the average value; and determined the limits by finding the deviations from the average (measured in terms of the S.D.) required to include in each class the observed frequency.

The S.D. was approximately 100, and so the range of the two classes marked "Fairly Intelligent" and "Slow Intelligent" was divided into 100 parts called *mentaces*. Pearson called average intelligence Zero, and expressed standings above and below by plus and minus scores. The numerical values of the classes were found by determining the number of cases falling between the averages for each two classes (based on the probability integral). These values are shown in Table XXXII. This table differs from the original one of Pearson's in placing average intelligence at 300 and indicating deviations above and below by steps; thus eliminating the use of plus and minus signs to indicate deviation above and below

the average. It also contains intermediate steps between the mid-points of Pearson's classes, allowing finer discrimination for such judges as care to use them.

TABLE XXXII

Numerical Values of Classes and Subclasses			
M+471	O+337	Q+220	S+96
M 451	O 322	Q 192	S 62
M—416	O—302	Q—177	
N+391			
N 371	P+282	R+157	
N—353	P 262	R 130	
	P—242	R—116	

Instructions were given as follows:

"In order to standardize judgments on mental ability, the following classification of intelligence has been selected. Please note that the scale covers the range of the population at large from the genius to the imbecile.

"On the accompanying blanks, please place the letter standing for the class in which you judge the student's mental capacities to fall. What is desired is a judgment of general intelligence and not of classroom performance. If the individual seems to be in one class with marked leaning toward another class, judge him to be in the more certain class and indicate the direction by + or —.

"Class L—Genius.

"Class M—Especially Able: A mind especially bright and quick both in perception and in reasoning; able and accustomed to reason rightly about things on pure self-initiative, even when the data are novel.

"Class N—Capable: A mind less likely than M to originate inquiry, but quick in perception and reasoning.

"Class O—Fairly Intelligent: A mind ready to grasp and capable of perceiving facts in most fields; capable of good reasoning with moderate effort. This group comprises, say, one-third of the total population.

"Class P—Slow Intelligent: A mind slow generally,

although possibly more rapid in some fields, but quite sure of knowledge once acquired.

"Class Q—Slow: A mind very slow, but not incapable of progress, granted time and considerable effort.

"Class R—Slow Dull: A mind capable of perceiving relationship between facts in some few fields with long and continuous effort, but not generally or without external aid.

"Class S—Very Dull: A mind capable of holding only the simplest facts, and incapable of reasoning about or grasping the relationship between facts. This group passes into the mentally defective.

"Class T—Imbecile."

This method has several advantages over those so far discussed. It provides definite steps on the scale, and gives the basis for a numerical index to be assigned to each person being rated. The mental trait under consideration is defined in unambiguous terms so as to bring the ratings on approximately the same basis. No dependence need be placed on rank order, for the location of each person on the scale is independent of the locating of others who may be rated. Accordingly, when a large group of persons are being rated it is not necessary that every judge be acquainted with every person rated. He can simply assign positions on the scale to such members of the group as he knows, and can omit those whom he does not know. The total ratings given any one person are added and the sum is divided by the number of persons who rated him.

The Army Method.—Further attempts to devise rating scales led to the invention of the army rating method used for rating officers. This is fully described in the volume entitled, Personnel System of the United States Army, and so will not be described in detail here. (9) It has the advantage, just noted in the Pearson method, of having numerical values attached to the various steps of the scale, and also the advantage of permitting each person to be rated independently of others. But the outstanding feature is an attempt to overcome the difficulty inherent in all rating, that of abstracting from a total situation and of weighing one trait apart from others. The army method attempted to take the ability, 'army officering,' separate it

into component abilities, and weigh each one, by assigning a numerical value to it. Five large groups of traits were made. In each one five levels were set and were given numerical values as shown below:

I. Physical qualities. Physique, bearing, neatness, endurance.

Highest	15
High	12
Middle	9
Low	6
Lowest	3

II. Intelligence, defined as ease of learning, accuracy, capacity to apply knowledge, and ability to grasp readily and to overcome difficulties.

Highest	15
High	12
Middle	9
Low	6
Lowest	3

III. Military leadership. Considered as aggressiveness, self-reliance, initiative, decisiveness, tact, and the ability to command the obedience, loyalty, and coöperation of men.

Highest	15
High	12
Middle	9
Low	6
Lowest	3

IV. Character. Loyalty, reliability, perseverance, cheerfulness, personal habits, and the spirit of service and general helpfulness.

Highest	15
High	12
Middle	9
Low	6
Lowest	3

V. General value to the service. As an administrator, instructor, leader in action.

Highest	40
High	32
Middle	24
Low	16
Lowest	8

Man to Man Comparison.—Another feature of this method is that it called for a judgment on the officer being rated not in terms of abstract qualities but in terms of his resemblance to a certain officer manifesting certain traits. This was brought about by requesting the rater to choose from his acquaintances among army officers certain ones who might serve as types standing at the various levels. The officer of his acquaintance who was best in military appearance should be placed in the division marked 15; the one who ranked lowest should be placed at the level marked 3; one should be chosen intermediate between these two and placed at the position 9, and two other appropriate officers should be placed at 12 and 6. The rater was asked next to prepare a similar scale of actual models with respect to each of the other groups of office ability; he might use different men for making his various scales. After these were made, he was asked to take each of the officers whom he was rating in turn and compare him with these actual officers in his 'yard-stick.' Let us suppose that he is rating Captain X. First abstracting physique, he was asked to forget all else about the Captain but his appearance; to compare this first with that of Major R (15), then with Major S (12), etc. (using the next highest rank; inasmuch as his rating was made to determine the eligibility of Captain X for promotion). The one whom Captain X most nearly resembled would determine what numerical rating he should receive in physical qualities. (If he fell between 15, and 12, he might be rated 13 or 14.) Next the rater was asked to abstract intelligence, to neglect for the moment all other qualities, and focus his attention upon that one feature of Captain X, to compare him with each of the concrete individuals on his sample scale for intelligence and give him the appropriate rating. The same method was to be pursued with all the other parts of the scale. The sum of the points given to the officer being rated was used as his total score. One hundred was the highest possible score.

This method embodies several virtues: dividing the complex work of army officering into its constituent parts, so as to facilitate the difficult process of abstract thinking on the part of the rater; and further concretizing the entire process by asking not

for a rating on abstract mental traits, but for a comparison with a specific individual; the provision of a numerical scale on which a person rated can have an absolute position independent of others in his group; the possibility of adding several such scores for a single individual and obtaining an average. All these merits seemed to make this scale adaptable for use in the army and, after the war, in other occupations. Attempts have been made to use it with salesmen, teachers and other vocational groups. Wherever it has been employed, however, including the army, certain objections have been vehemently raised. It is said to take too long a time and to require too much labor. In actual practice, army officers have been known to disregard the directions entirely and jot down a total rating somewhere between 20 and 100—the limits of the scores that may be obtained on the scale. In addition, actual inaccuracies in its use have been discovered by Rugg, who made an exhaustive analysis of results obtained through its use. (7) Because of these weaknesses it is hardly likely that the scale, in the form described above, will ever progress very far.

Scott Graphic Rating Method.—In order to keep the desirable features of the army scale and to eliminate the undesirable features further attempts have been made. One of these is called the Graphic Method, for which the Scott Company is responsible. A sample is reproduced in Figure 20, with the kind permission of A. W. Shaw Co. The steps involved in developing and using the rating scale are described as follows: "First, the selection of the qualities in which the employees are to be rated. This is obviously a matter for the determination of each company contemplating the use of the Scale. Care should be taken to select only those qualities which are important, which are capable of clear definition, and which are capable of measurement . . . The Scale for Executives includes such qualities as Personality, Originality, Leadership, Organizing Ability, Coöperativeness, Ability in Developing Workers, Technical Ability. That for Workers includes such qualities as Ability to Learn, Personal Productiveness (quantity of work achieved), Workmanship (quality of work), Industriousness, Initiative, Coöperativeness, and Knowledge of Work. . . . The

QUALITIES	14-a REPORT			
I. Consider his success in winning confidence and respect through his appearance and manner.	Inspiring	Favorable Unfavorable	Repellent	Indifferent	4
II. Consider his success in doing things in new and better ways and in adopting improved methods in his own work.	Highly constructive	Resourceful	Fairly progressive	Routine worker	7
III. Consider his success in winning the cooperation of his subordinates, in wielding them into a loyal and effective working unit.	Capable and forceful leader	Handles workers well	Fails to command confidence	Frequent friction in his department	6
IV. Consider his success in organizing the work of his department or unit, both by delegating authority wisely, or by making certain that results are achieved.	Effective even under difficult conditions	Effective under normal circumstances	Lacks planning ability	Inefficient	8
V. Consider his success in making his unit a smooth-running part of the whole organization; his knowledge and appreciation of the problems of other departments.	Exceptionally coöperative	Coöperative	Not helpful / Difficult to handle	Obstructionist	10
VI. Consider his success in improving his subordinates by imparting information, creating interest, developing talent, and arousing ambition.	Develops workers of high calibre	Develops workers satisfactorily	Neglects to develop workers	Discourages and misinforms workers	8
VII. Consider his success in applying specialized knowledge in his particular field, whether by his own knowledge of ways and means or through his use of sources of information.	Expert	Competent	Uninformed	Neglects and misinterprets the facts	9
	Final rating B		Total rating 52		

FIG. 20.

Adapted from Scott and Clothier's *Personal Management*, by kind permission of A. W. Shaw Company, Chicago, Publishers.

second step . . . is that of defining these qualities. Experience shows that it is faulty practice to define a quality with a single word or phrase such as Coöperativeness. Too much latitude is given to the individual executive to interpret the phrase in his own way. If he is permitted to do so, the important characteristic of uniformity in the rating procedure is destroyed . . .

"Experience has demonstrated further that it is well to omit the title of a quality even though it is followed by a definition. The natural tendency is for the rater to read the title, to assume that he understands it, and skip the definition. It seems established that the best practice in this respect is to use the definition alone as a means of identifying a quality. The rater is then compelled to read the definition; there is no short cut. Because he is compelled to read it, he necessarily forms a truer conception of its meaning.

"When the qualities have been carefully selected and when the definition of each has been carefully worked out from the point of view of clarity and precision of meaning, then, as the third step, attention is given to those phrases and adjectives which are to be used to indicate the varying degrees with which a person may possess each quality. Ordinarily it is advisable to use five such adjectives or phrases to indicate five progressive degrees within each quality, from the extreme minimum to the extreme maximum . . .

"The fourth step in the consideration of the scale is that which is concerned in the spacing of these adjectives and phrases under the horizontal lines. While in some cases it is natural for the phrases to be equidistant one from another, it frequently happens that unequal spaces are more truly indicative of the differences in meaning on the part of the phrases themselves. This is a matter of good judgment at first and later of experimentation . . .

"It should be pointed out here that the person who is rating his subordinate is under no obligation to put his check mark immediately above any of these adjectives and phrases. He is permitted to make his refinements of judgment as fine as he

pleases by placing his check mark between these two phrases if he chooses to do so. If, for instance, the supervisor being rated usually handles men well but occasionally destroys confidence by losing his temper, his superior is perfectly justified in putting his check mark somewhere between 'Handles Men Well' and 'Fails to Command Confidence,' at the point which seems truly to represent his judgment . . . .

"When the executive has rated his subordinates in this manner he delivers the Rating Scales bearing his check marks to the Personnel Department, where they are scored." . . .

Methods are devised that permit statistical corrections to be made which compensate for tendencies on the part of certain raters to rate either too high or too low, and the total ratings made on each person are combined. Where the several executives "have rated a certain employee B, the average will, of course, be B. Where one has rated him B, another C, another D, the average, of course, will be C. Where one has rated him C and two have rated him B, the average will be B—." This method is alleged to have two advantages. First, "the person who is making the judgment is freed from direct quantitative terms in making his decision of merits in any quality. Second, the person who is making the judgment can make as fine a discrimination of merit as he chooses." (8)

Which Scale to Use?—An account has now been given of the principal methods of rating that have been used. The reader is probably asking, What is the best method? The answer to this question, if there is any answer, can be given only after the investigation of several scales in various kinds of situations, and after a scientific comparison between the results secured with one and the results secured with another.

A Scientific Comparison between two Rating Methods.—The author made one such investigation, comparing ratings made on one scale with ratings of the same persons made by the same raters, on another scale. Defining intelligence as it is ordinarily defined, 'learnability,' he asked a group of university instructors to rate in intelligence 100 students. These students

had been rated several times throughout their college course (a systematic plan of rating having been in operation for some years), with the adaptation of the Pearson scale described above. In order to secure ratings with the second method, then, the author merely handed the list of 100 names to instructors who had had these students in class, and asked for ratings according to the second method. It was essentially the method of the Army Rating Scale, the only difference being that the instructors were asked to rate the students with respect to but one trait—intelligence. They were asked first to make a model scale, placing the most intelligent college student they had ever known at the top with a numerical value of 15, the stupidest one they had ever known at the bottom with a numerical value of 3, and three others at the other three steps of the scale. Then they were directed to rate the 100 students under consideration, comparing each one with the names on their model scale. A comparison of the ratings secured by these two methods is permitted by reference to Table XXXIII.

TABLE XXXIII

	Number of judgments			Average scores					Correlations with			
	Min.	Max.	Av.	Min.	Max.	Av.	M.V.	% D.	Grd's	P.E.	Tests	P.E.
Scale I	3	20	10.1	257.0	421.0	331.8	36.0	10	.62	.004	.40	.088
Scale II	1	7	3.0	5.2	13.4	9.9	0.91	10	.66	.012	.32	.094

The first thing to strike one's attention is the high average intelligence imputed to this group of university students according to both scales. In terms of Scale I the average for the population at large is 300 mentaces; that for these students, 331.8. According to the construction of Scale II the average for *all university students* is 9; that for these students, 9.9. The data give good indication that both scales are able to *differentiate a university group from a non-selected group.*

As to the consistency of the two scales in arranging the members of this selected group with respect to each other, the index of correlation between the two series of ratings is .61, ± .042, certainly significant, though not remarkably high.

As to the respective values of the two scales in measuring intelligence, we have only indirect light. The only access we have to this elusive trait is that gained through its expressions. Two commonly accepted expressions available for this investigation were academic grades and combined scores made in the psychological tests given to each student in his freshman year.[1] Ratings made with Scale I correlate with grades by .62 ± .004; ratings made with Scale II correlate with grades by about the same amount. Ratings made with Scale I correlate with scores made in the psychological tests by .40, ± .088; ratings made with Scale II correlate with test-scores by a closely similar amount. These figures tell us nothing about the *relative* accuracy of the scales in measuring intelligence. They inform us merely that rating by Scale I is about as effective in approximating academic grades as is rating by Scale II; and is about as effective in approximating scores made in the psychological tests as is rating by Scale II.

Both series of ratings correlate more closely with academic grades than with psychological test-scores. This may argue that in rating the instructors used the kind of ability leading to scholastic attainment as their chief gauge of intelligence. This conclusion is favored by the fact that when the two series of ratings are combined, the resulting series correlate with grades by .76, ± .028; with tests, by only .39, ± .089.

Both series of ratings agree with the available criteria of intelligence to about the same extent. Does this consistency mean that there is but one thing measured by the two scales even though it is given different definitions and different unit-steps? Or does it mean that the instructors made the same scale out of both? That in spite of their efforts to use different techniques in the two cases, they unwittingly employed the same? The writer is prepared to view the latter as a plausible contingency. It is possible that in making such estimations each judge prefers his own fixed method of procedure and leans toward it in

[1] Correlations computed according to formula for adapting the Pearson method to rank-differences.

spite of his efforts to adapt himself to the requirements of one scale or another.

These similarities in the operation of two apparently dissimilar scales suggest that in these days when rating scales are springing up so abundantly, time should be taken for *comparative* investigations. It is quite likely that two methods which at first blush seem widely divergent may turn out upon statistical analysis to be quite similar after all, and that certain features which appear to offer advantages do not work as they might be expected to work.

Rugg, after his intensive critical examination of results secured with the Army Rating Scale, concluded that the refinements incorporated in the rating scale do not make the ratings more accurate. He agrees with the opinion expressed above when he says, "We rate or judge our fellows in terms of general mental attitude toward them; . . . there is dominating this mental attitude toward the personality as a whole, a like mental attitude toward particular qualities."

Rugg further concludes that in order to secure more accurate ratings the best way is not to seek for refinements in the scale but to instruct raters in the technique of rating. In most cases of practical vocational adjustment probably a simple method will bring results if the raters are competent. In practical situations the method used must be comparatively simple so as to lay as light a burden as possible on already overburdened executives.

Practical Benefits of Ratings.—In business establishments where a system of rating is in operation distinct benefits are reported. The greatest benefit naturally lies in the assistance given in deciding on promotions. Under a non-systematic arrangement, when vacancies suddenly occur, there are no clear indications as to who should fill them. If, however, accurate objective records are on hand such as those recommended in the previous chapter, and if a long series of subjective ratings are also available, a fair decision can be more easily reached. Other benefits are cited by Scott and Clothier:

"1. A section head states that the Rating Scale made him give greater consideration to his workers as individuals in the assignment of work. This section head also attributes part of his own progress during the past year to improvement of his weak points as revealed by a use of the rating scale on himself.

"2. One foreman who was not friendly to the Rating Scale when it was first introduced, voluntarily remarked at the end of three months that the Scale had been used in bringing the merits of his workers to the attention of the higher executives.

"3. One executive states that the Graphic Rating had greatly assisted him in adjusting the wages of certain dissatisfied workers. This executive emphasizes the confidence he felt in making these wage adjustments in contrast with his feeling under similar circumstances when Graphic Ratings, Trade Test Ratings, and so forth, were not available.

"Less tangible evidence is available concerning the attitude of workers toward the Graphic Rating Method. A number of the workers voluntarily expressed their approval of the idea following the first periodic rating. One of these workers said that he wished he had known a year in advance just what qualities his supervisors considered to be important. He felt that he could have improved himself in those qualities he considered himself weakest in.

"No cases of objection to the method have come to our attention." (8)

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CHAPTER XIII

A TENABLE CONCEPTION OF VOCATIONAL FITNESS

Errors in the Popular View.—When the term vocational fitness is mentioned it is usually interpreted to mean the possession from birth of a certain vocational capacity. A large collection of common phrases indicate this: "Poets are born, not made." "I was not cut to be a salesman." "He is a born salesman." "He is a square peg in a round hole." The very word vocation implies this coming as it does from the Latin *vocare*—to call. It was applied—nobody knows how long ago—when men believed themselves called by God to preach. And its use has been extended to apply to fitness for any kind of work. A person's vocation has come to be regarded as a field to which he has been foreordained according to the constitution of the universe, and to which he must piously cling throughout his life.

Following upon this belief is the view that vocational guidance consists in examining an individual with more or less occult means (psychological tests are considered to be the most promising) and then predicting that he will be a success in this field and a failure in that. A few of the more enlightened persons do not think of it in quite such a bald way as this, but by far the great mass of people who think about the matter at all use these terms, at least in their thinking.

Vocations Change.—To hold that an individual is 'cut out' or 'born for' one or even a specific number of vocations and to attempt to designate him for one or several, at an early age, or at any age, is to assume that the world and the vocations in it will always be the same. As a matter of fact, this is an incorrect view of vocations. They are in constant change. Some disappear entirely and others arise. Let us take a hypothetical condition. Suppose that all the children born in 1900 had been designated correctly, each one for a particular vocation (on the

1900 quota) which he had entered at the age of 18. That might have done very well if the world had stood still as it was in 1900. The fact is, however, that the world has moved. Since 1900 several new vocational fields have opened up. Three that stand out conspicuously are aviation, the radio, and the moving picture. Under the system of vocational guidance just pictured, the young men of this generation would all have been settled into vocations and there would have been no one left to take the positions in the new fields that opened up. The absurdity of this picture shows how wrong it is to set an individual in an unchangeable vocational mold at birth.

The view of the vocational world as an evolving thing should be crystallized by scientific investigations showing statistically some of these changes. A good problem for economic research, for example, would be to chart, with the aid of Census Reports and other data, the histories of some of the dying occupations like perhaps wagon-making, bartending, etc., and to chart the progress of some of the newly born occupations like aviation, the radio. Not only are new vocations opening up; but also vast changes are occurring in older vocations, changes which have great bearing on this concept of the fitness of an individual.

Physical and Physiological Adaptability.—If we examine the human organism we find that it is highly adaptable. It can live in temperatures ranging from 110 degrees above zero to 45 degrees below. It can work in the conditions of blast furnaces and those of refrigeration rooms of packing houses. The same individual may adapt himself to the active outdoor life of the farm and the confined life of a book-keeper's desk. In the face of such facts how absurd it is to assume that an individual is fit for but one vocation!

The greatest evidence of human adaptability comes from a study of the nervous system. If one believes in the theory of innate fitness one must assume that the nervous system of a banker, for example, is different from that of a salesman. So far as is known there is nothing in the brain of either one of these men that is unique. Indeed, it has been demonstrated time after time that the same brain can encompass the habits necessary to solve both accounting problems and problems of salesmanship.

Nervous tissue of which the brain is composed is probably the most highly adaptable substance known. There is no limit to the number and kind of modifications that can occur in the brain of a person of average intelligence.

In holding to the evolutionary character of vocational fitness and denying as we do that vocational fitness is established at birth, we may be accused of going to the opposite extreme and teaching that fitness is a product solely of experience. In order to forestall such a charge, we shall pause long enough to point out that we already showed in Chapters Six and Seven what a large part is played by inherited intelligence, and possibly by other simple innate capacities that might be fundamental in certain occupations. If the reader then asks the old question, Which is of greater weight in determining one's vocational bents, inheritance or environment, we should answer as follows: 'Environment' and 'heredity' are not comparable. They are not qualitatively the same stuff. Furthermore, we can never speak of either of them in terms of 'all or none,' as the logicians say. Neither one is ever absent. Each is necessary for the manifestation of the other. Every innate action that occurs, comes in an environmental setting, and this setting modifies it at once. Every environmental situation calls forth some innate action. Just as a plant springs up through the ground, and while emerging, becomes modified by the things around it; bending around an obstructing stone; changing its color to accommodate to the light, so does man's original nature emerge through some environmental setting and take on vocational tinges while it emerges.

We must also acknowledge, as we freely did, in Chapter Seven, that there may be certain limiting physical conditions, such as the inability to make fine tonal discriminations, etc. It is conceivable also that there are temperamental limitations, the physiological basis for which lies in the automatic nervous system. These, however, constitute only limitations, which are not unsurmountable. Whatever their size, they surely do not offer any clue to the vocation for which an individual may have been 'cut out' at birth. This gives us the suggestion that perhaps the easiest kind of vocational guidance to give is nega-

tive, pointing out difficulties that the individual will face in trying to follow certain vocational avenues.

The Individual also Evolves.—But the most important lesson we learn from a consideration of the nervous system is this: the nervous system (which includes the brain) is an organ of vast adaptability. By means of it one can learn to speak in English, French, Russian, Spanish, can acquire a large number of vocational skills, and in doing so may undergo a process of evolution just as great as that which society undergoes.

Ethical Argument.—One of the strongest arguments, though admittedly *a posteriori,* is that the doctrine that each individual is 'cut out' for but a single vocation is a fatalistic position. It implies that if a person finds his niche he will succeed, if he does not find it he will fail, and the failure will not be any fault of his. We shall not argue for the rightness or wrongness of this view. We shall merely call attention to the fact that the greater part of the civilized world has discovered, in the course of its gropings after principles of conduct, that it cannot build a successful society on that doctrine. It must hold every normal individual responsible for his doings. If this is the correct view, we must hold that a man's vocational adjustment lies in his hands, and must be *made,* not looked for as a concomitant of creation.

Biographical.—The final argument against the prevalent view of vocational fitness comes from the simple fact that inquiry into the biographies of men and women shows that they have adjusted themselves equally well to a number of vocations. One name that will probably come to most persons' minds in this connection is that of Benjamin Franklin. He succeeded as a printer, but not less as an author; just as eminently as scientist—physicist, we should call him today; again as diplomat; many persons would rank him as an educator. Another name that comes to mind is that of Theodore Roosevelt, admittedly successful as author, naturalist, statesman, and soldier. But vocational versatility is not confined to the eminent. Among obscure persons are thousands who are equally able, and probably equally happy, doing a dozen different things; selling insurance, raising flowers, raising poultry, playing the

flute, etc. All these facts show the fallacy of the doctrine that an individual is fitted at birth—or at any other time—for but one occupational field.

Principles Underlying a Tenable View of Vocational Fitness.—Having canvassed the prevailing opinions and practices with respect to the idea of fitness, and having shown the fallacies in them, we shall now attempt to set forth a constructive statement regarding the nature of vocational fitness; summarizing the foregoing discussions, we shall try to answer the questions: What is vocational fitness? What is its source? How may it be detected, measured, and changed?

Fitness is an Evolving Thing.—Strictly speaking, one is never really fit for any vocation. As we have seen, he is not fit at birth; he is obliged to learn something in order to become fit. Even after he has gone through a period of learning according to the recognized rules of some vocation he has not reached a maximum of fitness. For example, suppose a young man goes through medical school, spends the required year serving an interneship; completing a period of study, including elementary and high school, of about twenty years. With all that training the young medical novice acknowledges that he is not fit to practice. When circumstances permit he prefers to go on for further post-graduate work. Even then he does not feel fit, for he lacks, as he himself admits, 'experience.' Even after he has supplemented his excellent and prolonged training period with some years of experience, he still feels that he is unfit to handle many cases; and so he attends clinics and association meetings and reads current literature with great avidity. If he is of the progressive type he seeks to make himself more and more nearly fit, though he never reaches his ideal. The same thing is true in any vocation. We might present the situation by paraphrasing Browning: Man never is, but always is becoming fit. In tacit recognition of this, salesmen, mechanics, stenographers, artists, scientists, are constantly studying, in schools, correspondence schools, post-graduate schools, private schools, in order to make themselves more nearly fit. The proof of our contention that this is the normal thing is that those who stand the highest in their fields are the ones who are doing

the most studying and who take ready-made 'fitness' least for granted. They view it as an evolving thing, a thing to be grown into. Life may require the individual to make new vocational choices from time to time. An electrician, for example, is obliged to decide, when some new application of electricity comes along, whether or not he shall engage in it; if so he will have to take some steps to prepare for it. Thus the proficiency that one achieves in one line becomes a stepping-stone on which to climb to another level of achievement.

Vocational success may be attained in two ways: by proceeding in one line continuously; or by rising to a considerable height in one field and then stepping over into another field (ofttimes on the same relative level of successfulness); advancing here to a considerable height, and then perhaps changing again. The matter may be likened to mountain climbing. One may proceed in an approximately vertical line and scale a single peak. Or one may rise to a considerable height on one peak and then cross over to a neighboring one on the same level. In other words, vocational progress may be both vertical and horizontal. It is really an evolution based on various components of experience. If this is true, we shall be obliged to hold that the individual may successfully adjust himself to several vocations. As we have seen, this evolutionary nature is a function of two things: the fluidity of society, which is continually discarding old practices and vocations and taking on new ones; and the adaptability of the individual, who is capable of an unlimited number of adaptations.

Vocational Adjustment a Continuous Thing.—In view of these facts another concept of vocational adjustment is needed. We cannot regard it as a process of taking an individual at a certain time of his life—some say in the sixth grade, some in the eighth, some at sixteen years, some at eighteen—and after examining him, condemn him inexorably and unchangeably to follow one particular vocation for the rest of his life. We must instead urge him to have a vocational aim as early as he wants to entertain it; then to let it change as he himself evolves, and as the demands of society change. See the discussion of the

sources of interest, Chapter Two. True, some vocational choices are constant, as in the often remarked and much exaggerated cases of musical, artistic, or mechanical genius. But at best such cases occur only two or three times in one hundred. The most common occurrence is that each individual formulates some vocational aim during his elementary and high school days. Of the one or two per cent. who go to college, practically all enter college with a more or less definitely formulated vocational aim. Figures gathered by the writer in the University of Indiana show that 95 per cent. of the freshmen express a vocational preference at entrance. It should be remembered, however, that it is not necessarily a permanent choice. It merely represents an expressed preference, stated because one is asked for. As a matter of fact, we know that it is not adhered to universally. One investigation covering several years shows that 17 per cent. changed their vocational aim at the beginning of their sophomore year. And of the 83 per cent. who supposedly maintained a constant aim, probably few succeeded in the vocation they preferred as a freshman. For light on this question, one has only to interview college deans, especially in colleges of liberal arts. Even after they are graduated many change. Statistics gathered by the writer show that of the persons in *Who's Who in America,* probably representing the most eminent college graduates, 16 per cent. have changed vocations. (See page 47.) One hundred thirty-three juniors in Goucher College (women) who had expressed a vocational preference in January, 1922, were studied again in 1924. Twenty-four per cent. had changed their first choice and 40 per cent. their second choice. As to the number of the graduates who were engaged in the vocation for which they had expressed a preference in their junior year only 24 per cent. were following their first choice and 27 per cent. their second choice. Twenty per cent. were pursuing vocations not mentioned at all in their first choice. Statistical investigations are greatly needed showing the actual conditions present among young people. And as we secure more information, we shall see more and more clearly the truth of the principle that vocational guidance, vocational adjustment, and vocational fit-

ness are only names for a process that should be continuous in its operation. (2) *

Vocational Guidance for Adults.—A belief is held in some quarters that vocational guidance is a thing to be administered to children in public schools—that each child should be given an interview and perhaps, at best some observation throughout his later school years, and then be guided into a vocation; that this should be done once and for all, like vaccination; that if it is done throughout the entire school system, all the members of this generation will be properly adjusted to their work and all the vocational niches in society will be properly filled.

A little thought will show the fallacy of this ideal. For one thing, even if all the children of the next ten years should be successfully shunted into vocational channels, we would still have a number of adults of the previous generation who are sadly maladjusted. The large number of adults of the present generation who are vocationally maladjusted seems to argue that in the next generation there would be a number of these unfortunates, even if we did try to adjust all the members of the present growing generation. Accordingly, society should focus attention upon this problem and seek to organize agencies that will give vocational succor to adults. The prophecy may confidently be made that the best aid one can render these adults is to help them to become more nearly fit in the vocations in which they are now engaged. Many far-seeing business establishments see this and offer facilities whereby ambitious employees may fit themselves for progressively higher vocational accomplishments. The

* Since this manuscript was completed interesting data on this point have been gathered by the Society for the Promotion of Engineering Education. Among 2760 recent graduates of engineering schools, 12 per cent. were found to be engaged in work of a non-engineering character, among 1334 older graduates, 16 per cent. were in non-engineering fields. Many of the others were engaged in work that could only be called "associated" engineering work. Of those who took the course in mechanical engineering, only 51 per cent. were found at work in precisely that field. It should be noted, however, that 96 per cent. of these graduate engineers express a definite liking for engineering work and 98 per cent. feel that they made no mistake in taking an engineering course.

American Institute of Bankers is only one of such agencies that may be cited.

Pitfalls in the Theory of Vocational Education.—As was said before, there is an impression in some circles that every child should be vocationally guided at an early age and then set in a path of 'vocational education,' becoming an apprentice in the trade of baker, machinist, etc. We cannot enter into a prolonged discussion of theories of vocational education, but we should note one pitfall in this conception. If a child is educated only through the eighth grade and then taken from books and narrowed down to such knowledge as he picks up in a trade, he thereby is restricted for the rest of his life. By being deprived of the broad foundational development and the cultural influences offered by the high school curriculum he becomes limited. Later he might want to become an executive, or proprietor of his own establishment; run for mayor or congressman; or go to a professional school. If, by reason of too speedy vocational guidance and too much 'vocational' education, he has not had a high school education, he greatly lessens his chances of evolving vocationally. He is condemned to run in a single groove.

In defence of such a practice it may be contended that an appreciable percentage of the population could never rise above the plane of routine manual performance anyway. The author grants this. But such is not the case for all members of society. There are many who may start out in a manual occupation but who, by using one job as a stepping-stone to another, may rise to considerable heights. Those who are capable of such evolution should not be side-tracked in a narrow manual track, even though their present bents seem 'mechanical' or 'vocational.'

Occupation vs. Vocation.—The conception of a vocation as an evolving thing really makes the word vocation inappropriate. As was said before, it connotes the idea 'calling,' a sacred mission which one must carry out whether or no. It carries with it the idea of permanency. As a matter of fact, in a society as fluid as that of the United States, a word denoting such fixity is not truly representative of the facts. Perhaps a more expressive term to use is 'occupation.' Most Americans

engage in occupations instead of in vocations, an occupation being what one is doing at the moment.

Not Positive Prophecy but Statement of Probabilities.— As avowed at the opening of this book, we are holding to the ideal of applying science to the problems of vocational adjustment. And according to some statements about the aim of science, we should therefore be aspiring to prophecy for each individual that he will succeed in this or that occupation. Regardless of the desirability of such an aim, we cannot allow it to enter into our conception of vocational guidance. James, in pointing out the complexities of abilities and interests, asserted that vocational biographies could not be written in advance regardless of the heights to which psychological technique might scale. On the basis of the foregoing discussion we are quite ready to accept this. If we cannot predict positively, what service can science make toward the solution of the problem? The answer is, that we will first investigate the vocational milieu; chart it to the best of our ability along the lines described in Chapter Four: will also measure the individual with the technique described in Chapters Six, Seven, and Eight. Though some persons would like to force us to go beyond these measurements and predict accurately what the economic conditions will be and what the individual will do in future vocational situations, a rigid view of the limitations of science forbids such an accomplishment. We cannot peer into the future to see what will be the status of the various occupations twenty years hence. For the same reason we are unable to predict the facility with which the individual will adjust himself to these unforeseen situations. The only thing we can safely do is to state *in terms of probability* what the individual may do in a vocational situation similar to the one we have charted in its present status.

We may find analogies in other fields. In medicine, for example, science has been used for many years, and yet no physician is bold enough to predict unequivocally that a patient will or will not get well. If pushed for exactness of statement he speaks only in terms of probability, of so many chances, that the patient will recover. In insurance underwriting, the situation is illustrated still more clearly. Suppose a man of

30 years inquires of an insurance company if he will live to the age of 70. Actuaries have studied thousands of cases and have discovered that of every 1000 men who are sound at 30, a fairly constant number, say 600, become septuagenarians. Let us suppose that the examining physician finds a man sound at 30. He does not tell him: "You will live to the age of 70." For although 600 in every 1000 (30-year-old men) achieve that age, this man may be one of the 400 to die at an earlier age from causes as yet unforeseen. Accordingly, the physician expresses the man's longevity in terms of probability, saying: "You have six chances in 10 of living to be 70." And to show the strength of its conviction the insurance company is willing to wager a specified sum with the applicant—the amount of the policy against the sum of the yearly premiums—that it can expect to receive in 600 cases in 1000.

If we are to have a reliable system of vocational adjustment we must follow a similar procedure. After having analyzed the vocations and having discovered what is needed in each vocation, we must measure the individual seeking adjustment in all respects possible, physical, psychological, economic, social. Then we must calculate the probabilities that he may stand at the

TABLE XXXIII

Test deciles		Vocational deciles									
Seven tests	Two tests	1	2	3	4	5	6	7	8	9	10
.80 to ?	.64 to ?	42	20	13	10	6	4	3	1	1	0
.53 to .79	.26 to .41	20	20	15	13	10	8	6	5	2	1
.33 to .52	.42 to .63	13	15	16	13	12	10	8	7	5	1
.16 to .32	.13 to .25	10	13	13	13	13	11	10	8	6	3
0 to .15	0 to .12	6	10	12	13	13	13	11	10	8	4
0 to —.15	0 to —.12	4	8	10	11	13	13	13	12	10	6
.16 to —.32	—.13 to —.25	3	6	8	10	11	13	13	13	13	10
—.33 to —.52	—.26 to —.41	1	5	7	8	10	12	13	16	15	13
—.53 to —.79	—.42 to —.63	1	2	5	6	8	10	13	15	20	20
—.80 to— ?	—.64 to — ?	0	1	1	3	4	6	10	13	20	42

various levels of achievement in the vocations which he is considering. The method recommended for this is the use of a probability-table such as that given in Chapter Six. To illustrate this method again, a table will be given which was recently made by Burtt and Ives according to this method. These investigators gave seven psychological tests to a group of students of agricultural engineering, arranged their scores in deciles and then made a probability-table (see Table XXXIII).

This table may be used as follows: "For example, suppose an individual scores .65 in the sum of the seven tests. This places him in the second highest decile. Then the chances are 20 out of 100 that he will be in the highest decile in the vocation, 20 out of 100 that he will be in the next highest vocational decile, 15 that he will be in the third decile, 13 that he will be in the fourth, 10 in the fifth, etc. By a decile of vocational ability is meant, of course, ability like that possessed by the given tenth of the group of students on whom the tests were standardized." . . . .

"The above example is typical of the use of the tests for vocational guidance. It makes it possible to tell the student something about his chances of success in this type of work. If the tests are to be used, on the other hand, for vocational selection it is necessary to select on the basis of the above distribution table a critical test score and admit to the agricultural engineering course only those who exceed that score. The probable calibre of students admitted or rejected on the basis of such critical score can be determined from the table. If, for example, those with a score algebraically less than .80 are rejected, the expectation is that none of the highest tenth of vocational ability has been rejected, but that 42 per cent. of those rejected are in the lowest tenth of vocational ability." (1)

The objection is urged by some that in stating the future in terms of equivocal chance we do not give much assistance to a puzzled youth who seeks to direct his energies along most profitable channels. Humans habitually yearn to foresee the future. They are prone to regard vocational guidance as a sort of Delphic shrine. This quest for certainty must be supplanted by a search for probability and a recognition of the limitations of human

knowledge. Moreover, the public must accept the fact that no person and no social machinery can exempt the individual from making his own decisions. A vocational counsellor can help; can point out opportunities and show their relation to the capacities of the individual, but if he is truthful—scientific—he will state such relationships in terms of probability only. The individual must make his own choice. All the forces on earth cannot relieve him of the responsibility.

A further limitation to the accuracy of our vocational prognosis is that fitness for a vocation must come partly through training, and a system of measurement that could indicate trained ability would be difficult to devise. For this reason we propose as a tentative principle that in vocational adjustment the greatest service which science can render is not to select a vocational field for an individual nor to select workers for an employer, dramatic and desirable as these undertakings appear. Science will render its best service in furthering the interests of the individual while he is at work; in helping him to perform his work more efficiently; to become deeply interested in it; to see the future possibilities in it; to prepare himself for them; and to realize them. For example, the Ford organization, which seems to be universally acclaimed as a model of good management, is organized on the principle that not selection but adjustment is the key idea. For when an employee fails to succeed in one position he is not discharged, but is transferred to another and possibly still another.

A number of other principles bearing on vocational fitness have been formulated and adopted by the National Vocational Guidance Association. With the kind permission of the Executive Committee of the Association these are reproduced in the Appendix.

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CHAPTER XIV

BROADER ASPECTS OF VOCATIONAL ADJUSTMENT

Need of Coördination of Effort.—In the preceding chapters we have dealt chiefly with the technical aspects of vocational adjustment; even more narrowly, we have confined ourselves to a consideration of the psychological aspects. We shall now consider a few of the larger administrative problems, problems concerned with vocational adjustment on a community-wide, nation-wide and world-wide scale.

As shown in Chapter One, there are many agencies in the United States organized for the purpose of facilitating vocational adjustment: agencies organized for the benefit of children in elementary and high schools; students in colleges, universities and professional schools; special groups of children, such as the physically handicapped, the mentally backward, the highly gifted; adults who are employed and adults who are not employed. In spite of the community of their aims these organizations are for the most part strangers to each other. It would seem the part of wisdom for them to unite and, so far as possible, coördinate their efforts. This coördination might be effected in local communities by means of meetings between representatives of the various agencies, who might arrange a program whereby the persons in the community who need vocational adjustment might be grouped on the basis of age, vocational aim, or some other classification; the aim being to avoid duplication of effort and to standardize methods.

Coördination should also be effected among national organizations interested in vocational adjustment. Some degree of coördination is being effected through the National Vocational Guidance Association, which was founded in 1912 by representatives of many agencies interested in vocational adjustment. The association has branches in several communities where large numbers of persons live who are engaged in vocational guidance

activities. *The Vocational Guidance Magazine,* which is the official organ of the association, is doing much to coördinate the efforts of the many diverse agencies throughout the country, and to advance ideas and practices in vocational adjustment.

International Aspect.—But there are still larger relationships that should claim attention. The problems of vocational adjustment have an international aspect. In Europe, particularly, they press for solution. The nations lately at war sense them perhaps with greater keenness than we of the United States, for with the demobilization of their large armies they saw thrown upon society a great host of young men, who, having been fighting since leaving school, had chosen no vocation, secured no vocational knowledge, and formed no vocational habits. Again, there are the maimed who have had to make new vocational adjustments. Finally, there are the women who, having discovered their economic possibilities, desire to find places in the working world. These conditions make vocational adjustment an especially pressing problem in Europe.

England.—In England, besides the educational and social agencies already described for American readers by Bloomfield (3), a more recent service has been developed in the National Institute of Industrial Psychology. Dr. C. S. Myers, formerly director of the Psychological Laboratory at Cambridge University, who has been active in coördinating various interests and obtaining support for the institute, and who is now its Director, makes the following statement regarding its history and aims:

"For some time the more progressive firms in this country have been interested in the application of psychological and physiological principles to industry and commerce. The Industrial Fatigue Research Board, which was established in 1915, has already done much to show the possibilities in this field. Its activities are, however, necessarily confined to broad surveys and investigations of common problems, and it was felt by many firms interested, that much of the value of its work would be wasted unless assistance could be obtained in the application of the principles to the special needs of individual firms. This work is obviously beyond the scope of a Board supported by public funds, and in order to meet this need a National Institute of

Industrial Psychology has been formed. This was incorporated under the Companies Act on February 11, 1921, as an Association for Scientific Research. It has the support of a number of well-known business men and in addition has a scientific advisory committee consisting of the heads of psychological, physiological, and educational departments of Universities throughout the Kingdom who are interested in the practical application of the sciences of psychology and physiology. Private individuals have come forward with generous financial support, and in addition the Carnegie United Kingdom Trust is giving substantial help. Where investigations are carried out which are likely to result in an immediate advantage to a firm, fees are charged which cover the salaries of the investigators and include overhead charges of the central body."

The work of the Institute may be ranged under six headings:

"(1) The study of the requirements of various industrial and commercial occupations, and the elaboration and application of suitable tests so as to secure (a), in coöperation with industry and commerce, more efficient and scientific selection of workers, and (b) in coöperation with the schools, more reliable guidance for children when choosing their life's work.

"(2) The investigation of the best methods for applying human energy in different factories, offices, etc., especially in regard to (a) the elimination of unnecessary movements, (b) the most advantageous distribution of rest periods, (c) the reduction of monotony and increase of interest.

"(3) The determination and realization of the conditions which tend (a) to the maximal health, comfort, and well-being of the worker, and (b) to the best relations between management and labor, *e.g.*, in regard to lighting, ventilation, methods of payment, labor representation, etc.

"(4) The study of the factors influencing the sale of products, *e.g.*, advertisements and designing.

"(5) The provision (a) of lectures to employers and to workers, and (b) of training courses for managers, foremen, welfare workers, and investigators.

"(6) The encouragement and coördination of research work on industrial psychology and physiology throughout Great

Britain, and the publication of the facts established by such research in a form which will indicate their practical value." (9)

From its office, 329 High Holborn, London, W. C., the Institute publishes its official organ, *The Journal of the National Institute of Industrial Psychology,* founded in 1922.

Some of the work done by the Industrial Research Board during the past five years,[1] though not undertaken primarily for purposes of vocational guidance, does, nevertheless, bear upon the problem materially, illustrating a fact that must strike every one who probes into the investigation of industrial problems from any angle; namely, almost every fact discovered about an industrial operation may be utilized in vocational guidance. Thus many of the facts this board discovered about industrial fatigue, and the methods they evolved, are turning out to be useful in vocational guidance. Their technique is bringing about the most sincere kind of vocational analysis, and is furnishing valuable information regarding the components of various occupations. In the same way the efficiency studies carried out in many American industrial plants and the more recent efforts toward job analysis may give similar enlightenment in the work of vocational guidance.

France.—A large measure of official sanction is given vocational guidance in France, especially as it is related to technical education. The report of the Minister of Education on whose recommendation official decrees have been issued includes the following statement:

"Under the Act of July 25, 1919, as amended by the Act of 21, June, 1920, the vocational training of young persons is placed under the control of the Under-Secretariat of State for Technical Education. Section 29 of the Act provides that in certain towns, to be specified by Ministerial Order, local occupational committees shall organize courses of training corresponding to the requirements of industry and commerce in the district. These committees are therefore required to ascertain

[1] The important reports of this Board may be secured from His Majesty's Stationery Office, Imperial House, Kingsway, London, W.C., 2. One of special interest is Report No. 12, Vocational Guidance (a review of the literature), by B. Muscio, 1921.

the size of commercial and industrial establishments in the town, the number of young persons in employment, and the number for whom employment can be found on leaving school.

"Under Section 47 the committees are also required to decide if a young man is capable of taking any given course . . . . The same Section provides for the establishment of a board of examiners who will hold practical and theoretical tests, and grant certificates of vocational ability, which should give the employers the necessary guarantees of efficiency." (8)

A number of the French bureaus of vocational guidance, such as those at Lyons, Nantes, Marseilles, and Nancy, are outgrowths of free employment offices working in conjunction with industries and with schools. Others have been organized especially for the *mutilés* of war. There is one at Bordeaux in connection with the *École Pratique et Normale de Rééducation professionnelle des Amputés et Estropiés de Guerre* under the directorship of Dr. Gourdon. There is another important bureau at Strasburg fostered by the *Chambres des métiers d'Alsace et de Lorraine,* and directed by M. Fontègne, *Professeur de l'Ecole Nationale Technique,* author of the latest and most thorough French treatise upon vocational guidance. (5) M. Fontègne is a strong advocate of the use of psychological measurements in vocational guidance.

Psychological methods, supplemented by physiological measurements, are warmly advocated by another French specialist in vocational guidance, M. Jules Amar. In his bulky volume, *Organization Physiologique de Travail,* (1) he recommends the thorough measurement of lung capacity, heart action, muscular tonicity, etc., of workers so that they may be placed in tasks within their physical powers. This author also makes much of the teachings of American efficiency engineers, such as Taylor and Gilbreth, to the effect that waste of human energy in industry should cease, and that work should be organized in accordance with the demands of the human organism.

An American visitor to the industrial centres of Europe, and especially to the laboratories of industrial research, feels at home immediately because he meets on every hand the well-known American fetish, scientific management, known in France

as *le taylorisme,* and in Germany as *Der Taylorismus.* There is a vast bibliography in French consisting of translations and critical expositions of American writings, made chiefly by engineers and economists. Naturally, not all agree with the tenets of the American system, but they find a good deal in it to apply. The seriousness with which they take it is evidenced by the course given at the University of Paris by M. Charles Cestre, upon American methods of industrial management.

A discussion of vocational guidance in France would not be complete without mention of the French periodical, *L'Orientation Professionnelle.* (11) Each number (it is a monthly) is filled with information, as exact as possible, about one or more occupations: engineering, mining, marine service, etc.; and with news concerning the progress of vocational guidance in France and other countries.

Germany.—In Germany, vocational guidance has been well known under the name *Berufsberatung* since the publication in 1913 of Hugo Münsterberg's book, *Psychologie und Wirtschaftsleben* (published in America under the title, *Psychology and Industrial Efficiency*). Following the publication of this book, various German psychologists and educators worked scatteringly at vocational problems until in 1919 official notice was taken of the matter by the issuance of various provincial and municipal decrees, authorizing the establishment of bureaus and institutes of vocational guidance. Stimulated by this overt recognition, and still more cogently by the necessity of speeding up production arising out of the demands of the Versailles conference, the German people are exerting feverish energy in the direction of vocational guidance. All kinds of interests are engaged in the cause: trade unions are passing resolutions recommending the establishment of research bureaus; engineers are preaching and practicing the adoption of principles of scientific management; schools, particularly vocational schools, are setting the necessary machinery into motion.

One of the first undertakings was the selection of chauffeurs in the Army. Two psychologists, Moede and Piorkowski, undertook, under the auspices of the Ministry of War, an examination of chauffeurs consisting of tests of visual and auditory acuity

and the articular sensation; 'attention,' momentary and prolonged; reaction time; capacity for work. The example set by Moede and Piorkowski so attracted the attention of the President of the State Railroads of Saxony that he installed at Dresden, in 1917, a laboratory where engineers were examined before being admitted to the service. An elaborate method of examining employees was arranged, involving the rapidity and accuracy of reaction; special memory; memory for numbers and words; endurance (ergograph); judgment of speed; capacity of rapid decision; night vision; accuracy of movements of the hand; measurement of the breathing, blood-pressure; etc. A similar laboratory was established at Berlin in 1908 for testing motormen. The results of these tests are said to be reduction in the turnover and a decrease of accidents amounting to 10 per cent.

The large industrial enterprises such as those of Krupp-Essen, Carl Zeiss, Iena, Borsig, and Tegel have installed laboratories for psychological testing. Results do not meet with unanimous praise. An inquiry conducted in twenty-two establishments where tests are in operation showed that only rarely was it possible to conclude that the tests were justified by practical results. It is worthy of note, however, that none of the establishments had abandoned their testing program, on the contrary new factories were adopting them. It is generally held that even if no more than ten per cent. of the unlikely apprentices are eliminated by tests much economy will be effected.

An interesting movement in Germany which, if not classifiable as vocational guidance, is certainly educational guidance, is that known as the school for gifted children. Twice a year 300 schools of Berlin send to a Commission appointed for the purpose, the best scholar in the seventh grade. This Commission examines all these children with a system of psychological tests and chooses approximately one hundred who shall be allowed to attend the "Schools for Gifted Children." In these schools the pupils work much more rapidly than those in the ordinary schools and soon enter the university or technical school. Their vocational programs are arranged somewhat according as psychological tests indicate mathematical or philological abilities. (2)

As may be inferred from the foregoing, psychologists are

particularly active. One group, working in the laboratory of William Stern at Hamburg, have made investigations on a number of vocations. There are several groups in Berlin, one under Lipmann and another under Moede. There is at least one periodical devoted specifically to psychological problems of vocational adjustment. (16) For more comprehensive accounts of German efforts in the direction of vocational adjustment the reader is referred to Lipmann (12) and Stern (18).

Switzerland.—Switzerland presents a picture of very clean-cut activity in vocational guidance. Most of the efforts receive their animus from the University of Geneva and the *Institut J. J. Rousseau.* This latter institution, founded in 1912 under the inspiration of M. Ed. Claparède, professor of experimental psychology at the University of Geneva, has been devoted chiefly to the application of psychology to educational problems. But in the light of the recent demands in vocational education, the Institute feels itself bound to direct a moiety of its energies into the industrial field. Since 1918 the Institute has been acting as a Bureau of Vocational Guidance giving psychological examinations and advice to young people who are sent to it by their parents, their teachers, or the central apprenticeship office. The services of the Institute are given to industrial establishments in vocational selection and industrial efficiency, and to schools, especially trade schools, in examining applicants for entrance. At the behest of the International Bureau of Labor the Institute serves as the coördinating agency for vocational guidance agencies all over the world. To this end it collects and translates for publication in the International Labor Review articles and books on vocational guidance; it has also started a series of monographs on vocational guidance under the auspices of the Bureau. Finally, it has installed a course of instruction in vocational guidance for counsellors and administrators of vocational guidance and for psycho-technicians, the name applied to those who apply psychology to vocational activities. The director is Pierre Bovet.

Belgium.—In Belgium there are several vocational guidance offices. That of Brussels, opened in 1914, discontinued during the war, was re-opened in 1919. It is being supported by a tax

levy of an annual rate of two centimes per inhabitant. The director is A. M. G. Christiaens.

Czechoslovakia.—In Czechoslovakia a vocational guidance office was opened at Prague in 1921. Naturally it is not yet firmly established; though 10 per cent. of the 5000 pupils who left the Prague schools in 1921 consulted it between May 1 and September 30. It coöperates with the Psycho-technical Institute of the Masaryk Academy in making its examinations of those who seek vocational guidance. (10)

Austria.—Vocational guidance offices have been established in Graz, Linz, Wiener-Neustadt, Vienna, and although not coordinated or standardized nationally, they are looking forward to federal uniformity. The conviction of the necessity for vocational guidance is gaining ground among all the classes of the population in Austria and a great deal of preparatory work has been done which only needs crystallization in united effort.

Spain.—In Spain, an institute for vocational guidance was opened at Barcelona in 1919, under the direction of Sr. J. Ruiz Castella, who has an able staff of specialists in anthropometry, psychometry, and statistics. They have already published two volumes of their "Anals." This bureau is supported by the municipality of Barcelona and the principality of Catalonia to the extent of about $8000 yearly (normal rate of exchange). Children leaving school to go to work are not obliged to visit the bureau, but they cannot register at certain desirable placement offices unless they receive advice at the bureau.

The author acknowledges that he has not cited all the vocational guidance undertakings in the world. Note might be made of tentative efforts in Holland, Poland, Finland, Japan, etc. The number increases almost from day to day and there appears to be no limit to what the future may develop. Enough has been said to show the great scope of the movement among civilized nations. Mention might be made of the fact that several international conferences have been held to further the world-wide interests of vocational guidance: in 1920 at Geneva, in 1921 at Barcelona; in 1922 at Milan. The international aspect of vocational adjustment has been very explicitly recognized by the International Bureau of Labor. When the League

of Nations was being formed, the international aspects of labor were recognized by the organization of an International Bureau of Labor; the considerations affecting this recognition being set forth in the Preamble to Part XIII of the Treaty of Versailles:

"Whereas the League of Nations has for its object the establishment of universal peace, and such a peace can be established only if it is based upon social justice:

"And whereas conditions of labour exist involving such injustice, hardship, and privation to large numbers of people as to produce unrest so great that the peace and harmony of the world are imperilled; and an improvement of those conditions is urgently required: as for example, by the regulation of the hours of work, including the establishment of a maximum working day and week, the regulation of the labour supply, the prevention of unemployment, the provision of an adequate living wage, the protection of the worker against sickness, disease, and injury arising out of his employment, the protection of children, young persons, and women, provisions for old age and injury, protection of the interests of workers when employed in countries other than their own, recognition of the principle of freedom of association, the organization of vocational and technical education, and other measures:

"Whereas also the failure of any nation to adopt humane conditions of labour is an obstacle in the way of other nations which desire to improve the conditions in their own countries: The High Contracting Parties, moved by sentiments of justice and humanity, as well as by the desire to secure the permanent peace of the world, agree to the following:"

In fulfilment of the aims there set forth it was soon seen that vocational guidance could be of extremely valuable service. The specific ways in which it could assist in raising the standard of labor conditions throughout the world have been described by a representative of the Bureau as follows:

"Vocational guidance is a problem that interests directly the activity of the International Bureau of Labor because it constitutes one of the primary conditions for the realization of the program of reforms set forth in the preamble of Part XIII of the treaty of Versailles. It may be considered as the basis of

practically all the measures prescribed in the Treaty of Peace for the amelioration of the conditions of work and for the realization of social justice, which must form the bases of universal peace.

"Specifically, it plays a capital rôle in 'the organization of technical and vocational instruction,' because it has for its purpose the selection of the well-endowed. It is the condition of 'rational recruitment of labor,' because it seeks to determine exactly the aptitudes of each one. It furnishes the worker with a weapon in his 'battle against unemployment,' because it increases his technical value. It aids in assuring him a 'living wage' because it raises his earning capacity to a maximum. It constitutes a 'protection to workers against general or occupational diseases and against industrial accidents, because it tends to give each one a job that accords with his physical capacities. It is a measure of protection for children and adolescents,' because on the one hand it has for its purpose to guide them at the threshold of life; and on the other, to determine 'the conditions necessary for the extension of their education and for the development of their physique,' it has an important bearing upon 'the protection of women' because it takes account of the physical and moral factors involved in women's work. It plays a part in that which concerns the disabled veterans, because it is at the basis of vocational re-education, the results of which will serve to determine the degree of incapacity of the *mutilé*. It can contribute to the 'defense of workers employed in foreign lands' because the phenomenon of emigration requires a scientific study of the ethnic elements whose influence from a vocational point of view is clearly important. Finally, having for its ideal the realization for each individual of the occupation which best suits his aptitudes and his tastes, and which procures for him the deepest and most lasting satisfactions, vocational guidance appears to be that condition of 'moral and intellectual well-being of wage-earners,' recognized by the signatory powers of the Treaty of Peace as being 'of primary importance from an international point of view.' Accordingly, the analysis of capacities is the foundation of a scientific organization of work and of an amelioration of the conditions of work.

"The International Bureau of Labor, whose functions comprise the centralization and distribution of facts concerning the international standards of working conditions, has, since its inception, devoted special attention to the question of vocational guidance. It has already organized services of emigration, of unemployment, and of industrial hygiene, in all of which it has recognized the important part played by vocational guidance. Similarly, in its efforts on behalf of those disabled in the war and in industry, it has been obliged to consider vocational guidance, notably in an article devoted to the vocational re-education of veterans in Great Britain. If the International Bureau of Labor has not been able heretofore to realize the establishment of a technical service devoted exclusively to the study of questions relative to education and apprenticeship, it has nevertheless charged one of its collaborators with the duty of centralizing all facts relating to these questions, of following their developments, and of maintaining contact with the measures taken or the experiments tried in the different countries.

"The information service of the Bureau takes great pains to collate from different journals and periodicals all facts bearing upon this question. A special category is devoted to technical education in the *Facts of the Day,* published bi-weekly. In addition, the Bureau proposes to publish in the *International Labor Review* special articles upon vocational guidance written by specialists who have promised their coöperation.

"Animated by the desire to follow as closely as possible the development of vocational guidance and cognate problems, the Bureau is constantly enlarging its library so as to include the most important works upon the question. It announces regularly in its 'bibliographical notes' recent publications on vocational education. In addition, it publishes in the *International Labor Review* bibliographical notices of publications pertaining to the general subject.

"Finally, it has already entered into relation with such organizations as The Taylor Society of the United States, the Industrial Fatigue Board of Great Britain, and the *Cours d'Orientation Professionnelle de France,* as well as with indi-

viduals who are devoting their attention to the problems of vocational guidance. The department of public instruction of the canton of Geneva, in particular, has willingly placed at its disposal results of valuable experiments carried on in cantons of Switzerland.

"The International Bureau of Labor followed with the greatest interest the deliberations of the first international conference of psycho-technics applied to vocational guidance, which was held at Geneva in 1921 under the presidency of Professor Claparède; and M. Albert Thomas, in greeting the delegates who came to visit the International Bureau of Labor, assured them warmly that he considered their contributions most important for the realization of the tasks which the bureau has undertaken.

"Desirous of neglecting no aspect of the task before it, and convinced of the immense importance that vocational guidance will assume in the scientific organization of work, the International Bureau of Labor will be particularly happy to follow the deliberations and to heed the counsels of the Second International Conference of Psycho-technics Applied to Vocational Guidance and Scientific Management." (17)

Thus is shown the strategic position that vocational adjustment occupies as a world problem. Thus, too, might be parenthetically added, is shown the importance that the international leaders of organized labor attach to it.

In this chapter we have tried to show that vocational adjustment is more than a local problem; more than a national problem; indeed, that it is international in its scope. We have cast a brief glance over the world and have found that wherever human beings are working, there is recognized the necessity for systematically assisting them to adjust themselves to their work.

The methods thus far evolved for making these adjustments have now been outlined. They are still in an unfinished state, guided more frequently by common sense than by science. Even with their limitations, however, they have brought succor to many individuals who have been groping their way through the fog of maladjustment, and there is reason to expect that as they develop they will become increasingly beneficial to humanity.

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THE PRINCIPLES OF VOCATIONAL GUIDANCE

As Formulated and Adopted in 1924 by the National Vocational Guidance Association *

The principles of guidance as herein presented are treated from the standpoint of the teacher, school administrator, vocational counsellor, parent, social, civic, and religious worker, and personnel worker in employment. Upon these workers, according to their opportunity, must rest the responsibility of vocational guidance.

I. A DEFINITION OF TERMS

1. The term 'vocational' comprises all gainful occupations, as listed in the United States census of occupations, and homemaking.

2. Vocational guidance is the giving of information, experience, and advice in regard to choosing an occupation, preparing for it, entering it, and progressing in it.

3. Educational guidance is the aid furnished individuals in making such decisions as choice of studies, choice of curriculums, and the choice of schools.

II. THE NEED FOR VOCATIONAL GUIDANCE

1. In this country fully 50 per cent. of our children leave school by the end of the sixth grade; 25 per cent. more by the end

* The Principles of Vocational Guidance were first formulated in 1920 by a special committee of the Association, and adopted February, 1921, at the annual convention at Atlantic City. In 1923 the Association authorized the New England Vocational Guidance Association to revise and redraft the statement. The report was presented to the 1924 convention of the National Association, and was referred to its board of trustees, by whom it was amended and adopted. The National Vocational Guidance Association is an organization for the study and furtherance of educational and vocational guidance. Each member of the National Vocational Guidance Association is entitled to one copy of this statement. The price for additional copies and to the public at large is five cents, postpaid. Orders may be sent to The Bureau of Vocational Guidance, Graduate School of Education, Harvard University, Cambridge, Mass.

of the grammar school; and over one-half of those who enter the high school leave before graduation. Vocational guidance, then, is needed to keep a larger number of children profitably in school and to facilitate their leaving under conditions favorable for worth-while employment.

2. Within about forty years' time the population of our country has doubled, the number of our racial elements has greatly increased, and our cities have become overcrowded. Within the same time our occupations have greatly increased in number, technicality, complexity, and specialization. Within the same time the typical American family has become less capable than formerly to give vocational direction to its children; the public school has had difficulty in keeping pace with the changed needs of our cosmopolitan population; and society at large has failed to understand and assume responsibility for the vocational choices of our young people. Organized vocational guidance must be provided to meet the new needs of our modern world.

3. Education is provided to enable pupils to become useful members of society. Vocational guidance will prepare them to make more wisely the important decisions which they are called upon to make throughout life. Therefore the service of vocational guidance should be provided for in the curriculums of the public schools.

4. Since work occupies one-half the waking time of active individuals and presents complex difficulties which can be solved only through the extension of education, careful study should be given to all the problems involved in vocational life.

5. Modern life demands as never before right contacts and coöperation. Vocational guidance of some sort is inevitable. No one can avoid the need for making occupational decisions. Adequate guidance should be provided under supervision to offset the unwise and false guidance of untrustworthy advertisements, suggestion, selfishness, ignorance, and other prejudiced or unscientific sources.

III. THE AIMS OF VOCATIONAL GUIDANCE

The purposes of vocational guidance are:

1. To assist individuals in choosing, preparing for, entering upon, and making progress in occupations.

2. To give a knowledge of the common occupations and of the problems of the occupational world, so that pupils may be prepared for vocational as well as political citizenship.

3. To help the worker to understand his relationships to workers in his own and other occupations and to society as a whole.

4. To secure better coöperation between the school on the one hand and the various industrial, commercial, and professional pursuits on the other hand.

5. To help adapt the schools to the needs of the pupils and the community, and to make sure that each pupil obtains the equality of opportunity which it is the duty of the public schools to provide.

IV. THE CONTENT OF VOCATIONAL GUIDANCE

1. Drifting through school is a common evil in all educational systems, as in life itself. The vocational motive, whether temporary or permanent, should be encouraged as one of the motives in the securing of useful experiences and in the choice of a curriculum.

2. The home and school programs should include a combination of play, handwork, coöperative activity, and academic work, the whole being varied enough to represent life's demands, and concrete enough to secure an effective response and successful accomplishment by each individual child. For all children, before the close of the compulsory school period, there should be provided a wide variety of try-out experiences in academic and esthetic work, gardening, simple processes with tools and machines, elementary commercial experiences, and coöperative activities. Such try-out experiences are for the purpose of teaching efficiency in every-day tasks, broadening the social and occupational outlook of the children, and discovering to them and the teachers their interests and abilities.

3. Children in school should be dealt with on the basis of individual differences revealed in the social life of the child, progress in school subjects, and in standardized tests.

4. Teachers of all subjects in schools and colleges should make a definite effort to show the relation of their work to occupational life, just as they now relate these studies to other phases of life activity, such as the cultural, recreational, ethical, civic, and social.

5. The miscellaneous working experiences of school children should be made to aid the child in understanding his environment and in discovering his vocational aptitudes and interests.

6. All forms of part-time education, such as the continuation school, and coöperative courses, and trade extension and trade preparatory courses, should be provided, in order that school and work may be brought into closer coöperation and that there may be more careful supervision of the child in employment.

V. METHODS IN VOCATIONAL COUNSELLING

1. STUDYING THE INDIVIDUAL.

(*a*) Counsellors should interview individuals at regular intervals, particularly at such critical times as one year before the school-leaving age, promotion from one school to another, change of course, leaving school, and when meeting the problems connected with work. Such counselling should include studies by case-work methods of the social life of each child and conferences with parents whenever practicable, in order to obtain knowledge of the child's environment, interest, behavior, and personal data regarding his problems. This counsel should be a regular responsibility of the school. For the solution of difficult cases all the facilities of the regular case-work method should be available.

(*b*) Special attention should be paid, by the school or by suitable agencies or individuals, to adults whose guidance has been neglected, and to handicapped persons.

(*c*) Counsellors should study the educational offerings of the community through its schools, museums, art galleries,

libraries, etc., in order to enable children and adults to use these opportunities in preparation for a vocation or for further school or college training.

(*d*) Whenever tests of general intelligence are used this should be done with the greatest care. No important decisions should be made on the basis of a group test alone; special classifications and assignment of special curriculums should be made only after an individual examination by a carefully trained and experienced psychologist. Whenever time and facilities permit, tests of occupational skill and knowledge should also be used.

(*e*) Cumulative records should be kept for individuals. These should include academic records, social conditions, physical and mental records, and the results of counselling.

2. TEACHING THE OCCUPATIONS.

(*a*) The study of the common and local occupations, vocational opportunities, and the problems of the occupational world, should be carried on before the end of the compulsory school age. Such study should be provided, in organized classes, for all students in junior high and high schools. It should give the pupil an acquaintance with the entire field of occupations, and a method of studying occupations wherewith he can meet future vocational problems. In addition the study of occupations should be offered in continuation schools, evening schools for adults, and colleges.

(*b*) Teachers of classes in occupations, counsellors, or investigators, should be given time to study occupational needs and opportunities.

3. AIDING IN THE CHOICE OF A VOCATION.

(*a*) The choice of a vocation should not be made too early or too hurriedly and should be made only after the study of occupations and try-out experiences. It should be an educational process by progressive elimination.

Provision should be made for reconsideration and rechoice. Care should be taken that the choice be made by the individual himself.

(*b*) Vocational guidance should discourage and supplant any attempt to choose occupations by means of phrenology, physiognomy, or other unscientific hypotheses.

(*c*) Alluring short cuts to fortune, as represented by current advertisements, should be investigated, condemned, and supplanted by trustworthy information and frank discussion.

(*d*) Occupations should be chosen with service to society as the basic consideration, and with personal satisfaction and remuneration as next in consideration.

4. GUIDANCE IN RELATION TO VOCATIONAL EDUCATION.

(*a*) Vocational guidance must be provided before, during, and after courses in vocational education if these courses are to be truly effective. Students in vocational courses should be enrolled only after careful selection on the basis of fitness and well-considered choice.

(*b*) In order that the aims of vocational guidance may be secured, those in charge of vocational education should include a study of the common occupations and their problems in any plan of vocational education.

(*c*) In accordance with the best practice among those in charge of vocational education, plans should be adopted by which vocational education and education for citizenship may be continued in factories, shops, and stores, enabling workers to understand the problems of work and to make progress toward a better organization of working life and a better standard of living.

(*d*) It is desirable that in connection with vocational education, opportunities be provided for experiences in the vocation under occupational conditions. There should be vocational guidance in connection with the assignment to, and the procedure within, such occupational experiences.

(*e*) Adult education, both vocational and general, should be provided through a variety of short-unit courses in day and evening schools.

5. RETAINING THE STUDENT IN SCHOOL.

(*a*) Since investigations have shown that economic necessity is only a minor cause for leaving school at the end of the compulsory school age, those interested in vocational guidance should always insist that the school itself enter into a campaign to hold pupils by offering a more varied program suited to the individual needs of the students.

(*b*) Between the compulsory school age and the time for full participation in industry, there should be substantial compulsory part-time schooling in the daytime.

(*c*) Means should be found, through either public or private funds, to provide scholarships when needed to keep pupils in school, or for continuing schooling on a part-time arrangement.

6. GUIDANCE IN RELATION TO EMPLOYMENT.

(*a*) The choice of a position or a vocation should take into consideration the physical condition and mental attainment of the young person and the future offered by the occupation.

(*b*) Placement should come only after a careful and persistent effort has been made to keep the pupil in school, and whenever possible it should be in part-time work for a substantial period.

(*c*) Placement and employment supervision should be accompanied by advice regarding opportunity for supplementary study and promotion. Placement should always be regarded as but one of the later steps in a complete program of vocational guidance.

(*d*) Vocational guidance workers should coöperate with personnel managers, labor organizations, employers' associations, coöperative societies, government officials, social and civic organizations, and others interested in problems of work.

(*e*) School systems should undertake follow-up work and employment supervision, to extend throughout the time of the minority of the child and to be exercised in co-operation with the above-mentioned agencies. For several years after leaving school students should be encouraged to keep in touch with the vocational counsellors of the school system to which they formerly belonged.

(*f*) Non-commercial and public employment agencies for persons under 21 years of age should be conducted jointly with the local educational authorities and in the closest possible relation with the public schools. For the purposes of standardization and coördination, private non-commercial agencies for aiding persons to secure employment or to transfer them to more suitable positions, should be under public supervision or control. Commercial employment bureaus, even under a licensing system, should be supplanted as rapidly as possible by public employment systems.

VI. THE ORGANIZATION AND ADMINISTRATION OF VOCATIONAL GUIDANCE

1. The organization required for vocational guidance will depend in large measure upon the size of the community which it serves and upon the existence of other organizations capable of rendering supplementary services. A small organization, or even a single individual, can handle the work in a small place, but large cities will require fully equipped bureaus for vocational guidance.

2. The central agency should receive advice and assistance from an advisory council, from special research committees, and from counsellors.

3. The advisory council should be composed of interested individuals or of representatives of organizations whose activities relate them to the work of vocational guidance. It should advise in planning the vocational guidance activities adapted to the

community and should be helpful in enlisting the coöperation needed when gathering information or when making placements.

4. Research, by persons qualified by experience and training, should be carried on to give assistance in solving such special problems as those connected with the guidance and protection of mentally or physically handicapped children, with aiding foreigners to adjust themselves to American conditions, with the promotion of the health of women workers, and with the gathering of information needed in legislation.

5. Vocational counsellors are needed in schools or other institutions whenever there are persons whose satisfactory guidance requires many individual conferences.

6. Since vocational guidance must concern itself chiefly with young persons found in the public schools, and since this activity is related closely to the general economic welfare of the community, it is advisable that the agency undertaking this work should be a part of, or closely affiliated with, the publicly supported educational system. This will promote the coördination of vocational guidance activities with the work of attendance and certification officers, and of persons giving physical and mental tests, and of persons engaged in developing means for supplying school children with vocational information and education.

7. The intelligent interest and coöperation of all teachers should be secured, by means of teachers' meetings, reading circles, and institutes.

VII. THE EQUIPMENT AND TRAINING OF VOCATIONAL COUNSELLORS

1. Since the service of vocational guidance is of such growing importance and of such a peculiar nature, it is evident that it should be given only by persons having the necessary personal qualities and special experience and training.

2. The personal qualities of the vocational counsellor should include human sympathy, interest in and understanding of young people and their problems, tact, patience, the spirit of service, and research ability.

3. The counsellor should have a good general education, including the study of economics, sociology, industry, psychology, and education.

4. The counsellor should have experience in various forms of social endeavor, such as public school teaching, social work, and personnel work in industrial and commercial establishments.

5. The counsellor should have special training for the work in a formal course or courses in vocational guidance of a college or university grade. These courses should be organized under such major topics as the following: The Principles of Vocational Guidance; Vocational Counselling; Organization for Vocational Guidance; Occupational Information, Research, and the Survey; The Conduct of Life-Career Classes; Psychology Applied to Vocational Guidance; Special Problems in Vocational Guidance.

VIII. CONCLUSIONS

1. It is necessary to have a clear understanding of the terms used in vocational guidance both to save confusion in the minds of those who are interested, and to aid in establishing standards.

2. The need for vocational guidance is self-evident when we consider the rapid growth and changes in population in our country, the changes in the employments, and the great social waste that results from unguided personal ability.

3. The major purpose of vocational guidance is to help the individual. It also aims to modify the school and occupational procedure, and to improve relations between the school and the community, so as to further the major purpose.

4. The content of vocational guidance should be such as to reveal to the young person his own capabilities and the nature of the world of work, and to enable him to make the proper correlation for happy and useful living.

5. The chief means used in vocational guidance should be the careful study of the individual and the presentation to him of the varied opportunities and responsibilities of his future life, together with the constant use of an adequate system of records.

6. The size and character of the agency for vocational guidance will depend upon the size and character of the community

or organization which it is to serve. Aside from the official organization of the vocational guidance department, coöperation with civic, businss, social, and religious agencies is absolutely essential.

7. Experience has shown that adequate preparation of counsellors is of vital importance.

IX. THE OUTLOOK IN THE FIELD OF VOCATIONAL GUIDANCE

1. The outlook in the field of vocational guidance is based upon the past development of the movement, the present widespread interest in it, and the continually increasing provision for its support.

2. Bureaus of vocational guidance, research, and placement have been established in many communities.

3. Public school systems have in many places adopted more or less formal systems of vocational guidance.

4. Schools and colleges have extended the work of deans, vice-principals, and faculty advisers to include vocational guidance activities.

5. Social, civic, and welfare organizations have added some measures of vocational guidance service to their activities.

6. The National Vocational Guidance Association and the local associations are now more active than ever, and their growth is indicative of the steady progress of the movement.

7. The program of the public school is being modified gradually to meet the vocational guidance needs of young people.

8. Those responsible for vocational education are coming more fully to recognize and profit by vocational guidance.

9. Improved methods of child study and testing offer great promise for better guidance service.

10. The establishment of classes in occupations in the schools, in continually increasing number, indicates the great advance of vocational guidance in this field.

11. The establishment of training courses in vocational guidance in colleges and universities is evidence of the growing demand for trained counsellors and workers.

12. It is being more and more widely recognized that not only should there be specially trained vocational counsellors, but that all teachers and other workers for young people should have vocational guidance training as a part of their equipment.

13. Increased interest in vocational guidance is shown in foreign countries, in part at least as a means of aiding in recovery from the conditions following the World War.

14. In all of the evidences here presented, vocational guidance appears in the educational world as a most vital and far-reaching service.

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